NASA Technical Memorandum 4221

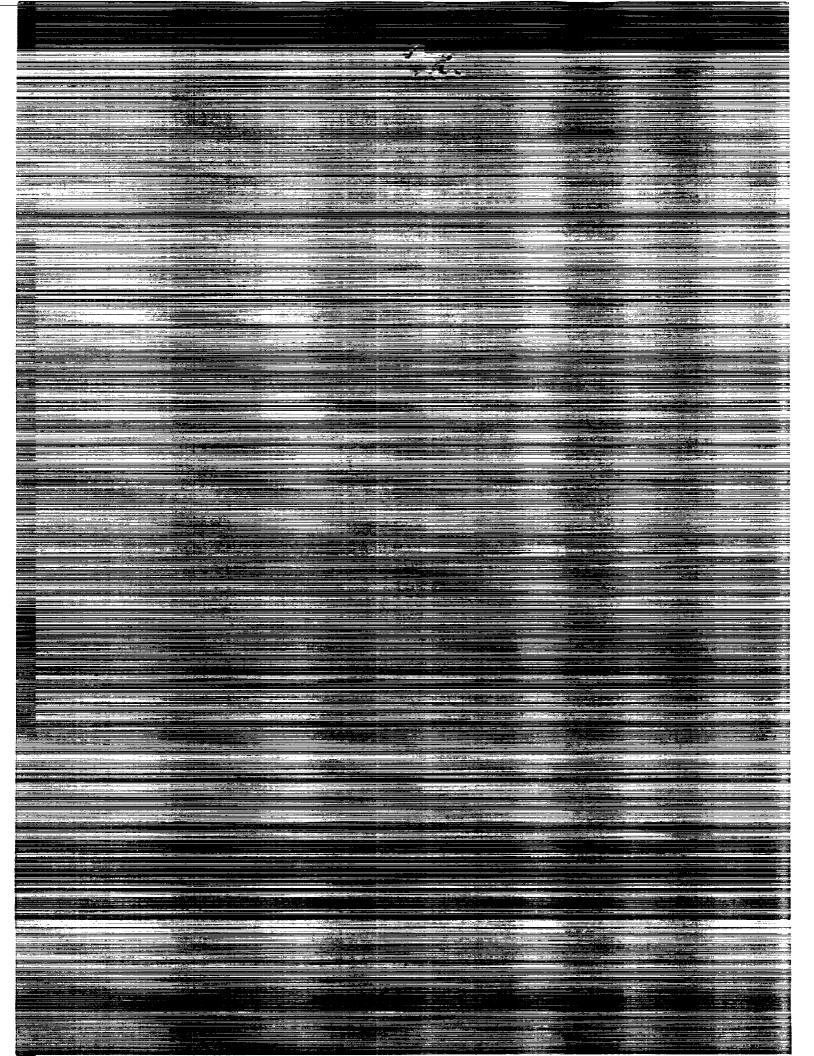
- A Bibliography of Planetary
- **Geology and Geophysics**
- Principal Investigators and
- Their Associates, 1989–1990

DECEMBER 1990

(NASA-TM-4221) A BIBLINGMAPHY OF PLANETARY GEOLOGY AND GEOPHYSICS PRINCIPAL INVESTIGATORS AND THEIR ASSOCIATES, 1989-1990 (NASA) 54 p (CSCL 03C)

371-15034

Unclas H1/88 0319082



NASA Technical Memorandum 4221

A Bibliography of Planetary Geology and Geophysics Principal Investigators and Their Associates, 1989–1990

NASA Office of Space Science and Applications Washington, D.C.



National Aeronautics and Space Administration Office of Management Scientific and Technical Information Division

Contents

Asteroids, Comets, and Meteorites	3
Outer Planets, Satellites, and Rings	5
Photogrammetry, Geodesy, and Cartography	7
Geologic Mapping, Stratigraphy, and Geomorphology	9
Structure and Tectonics	14
Volcanic Processes and Landforms	18
Aeolian Studies	23
Fluvial Processes	25
Impact Cratering Processes	27
Planetary Interiors and Petrology	30
Geochemistry: Regolith, Volatiles, and Atmospheres	32
Remote Sensing Spectroscopy Photometry Radar	34 35 39 40
Planetary Dynamics and Cosmogony	43
General Interest Topics	46
Author Index	47

The second second

A Bibliography of Planetary Geology and Geophysics Principal Investigators and Their Associates, 1989-1990

This document is a compilation of selected bibliographic data specifically relating to recent publications submitted by principal investigators and their associates, supported through NASA's Office of Space Science and Applications, Solar System Exploration Division, Planetary Geology and Geophysics Program, and serves as a companion piece to NASA TM-4210, Reports of Planetary Geology and Geophysics Program—1989, NASA, Washington, D.C. 20546.

		
	-	

Asteroids, Comets, and Meteorites

Bell, J.F., Davis, D.R., Hartmann, W.K., and Gaffey, M.J. (1989) Asteroids: The Big Picture. In Asteroids II, ed. R.P. Binzel, M.S. Matthews, and T.S. Gehrels, p. 921-945. Tucson, Ariz.: University of Arizona Press.

Cellino, A., Zappala, V., Davis, D.R., Farinella, P., and Paolicchi, P. (1990) Angular Momentum Splash: Despinning Asteroids Through Catastrophic Collisions. *Icarus*, in press.

Davis, D.R., and Ryan, E.V. (1990) On Collisional Disruption: Experimental Results and Scaling Laws. *Icarus* 83:156-182.

Davis, D.R., Weidenschilling, S.J., Farinella, P., Paolicchi, P., and Binzel, R.P. (1989) Asteroid Collisional History: Effects on Sizes and Spin 1989. In *Asteroids II*, ed. R.P. Binzel, M.S. Matthews, and T.S. Gehrels, p. 805-826. Tucson, Ariz.: University of Arizona Press.

Dermott, S.F., and Nicholson, P.D. (1989) IRAS Dust Bands and the Origin of the Zodiacal Cloud. Highlights of Astronomy 8:259-266.

Dermott, S.F., Nicholson, P., Gomes, R., and Malhotra, R. (1990) Modelling the IRAS Solar System Dust Bands. Adv. Space Res. 10(3):171-180.

Dermott, S.F., Tedesco, E., Nicholson, P., Kim, Y., and Wolven, B. (1988) Asteroids. In *Comets to Cosmology*, ed. A. Lawrence, p. 3-18. Berlin: Springer-Verlag.

Engel, S., Lunine, J.I., and Lewis, J.S. (1990) Solar Nebula Origin of Volatiles in Comet Halley. *Icarus*, in press.

Fanale, F.P., and Salvail, J.R. (1989) The Water Regime of Asteroid (1) Ceres. Icarus 82:97-110.

Fanale, F.P., and Salvail, J.R. (1990) The Influence of CO Ice on the Activity and Near Surface Differentiation of Comet Nuclei. *Icarus* 84:403-413.

Farinella, P., Davis, D.R., Paolicchi, P., Cellino, A., and Zappala, V. (1990) On the Collisional Evolution of Asteroid Rotation Rates. *Lunar Planet. Sci. XXII*:345-346.

Fujiwara, A., Cerroni, P., Davis, D.R., Ryan, E.V., Di Martino, M., Holsapple, K., and Housen, K. (1989) Experiments and Scaling Laws for Catastrophic Collisions. In *Asteroids II*, ed. R.P. Binzel, M.S. Matthews, and T.S. Gehrels, p. 240-265. Tucson, Ariz.: University of Arizona Press.

Gaffey, M.J. (1989)An Asteroid Perspective on the Early History of the Inner Solar System (abstract). In AIAA/JPL 2nd International Conference on Solar System Exploration, California Institute of Technology, August 1989.

Gaffey, M.J. (1989) Implications of Asteroid Surface Mineralogy for Evolution of the Inner Belt. In Asteroids, Comets, Meteors III, p. 46. Uppsala, Sweden: Uppsala University.

Gaffey, M.J., Bell, J.F., and Cruikshank, D.P. (1989) Reflectance Spectroscopy and Asteroid Surface Mineralogy. In *Asteroids II*, ed. R.P. Binzel, T.S. Gehrels, and M.S. Matthews, p. 98-127. Tucson, Ariz.: University of Arizona Press.

Gaffey, M.J. (1990) Thermal History of the Asteroid Belt: Implications for Accretion of the Terrestrial Planets. In *Origin of the Earth*, ed. J. Jones and H. Newsom. Houston, Tex.: Lunar and Planetary Institute, in press.

Grimm, R.E., and McSween, H.Y., Jr. (1989) Water and the Thermal Evolution of Carbonaceous Chondrite Parent Bodies. *Icarus* 82:244-280.

Hamilton, D.P., and Burns, J.A. (1989) Orbital Stability Zones Around Asteroids. Bull. Am. Astron. Soc. 21:969.

Lipschutz, M.E., Gaffey, M.J., and Pellas, P. (1989) Meteoritic Evidence on Asteroid Parent Bodies. In Asteroids II, ed. R.P. Binzel, T.S. Gehrels, and M.S. Matthews, p. 740-777. Tucson, Ariz.: University of Arizona Press.

Lunine, J.I. (1989) Primitive Bodies: Molecular Abundances in Comet Halley as Probes of Cometary Formation Environments. In *The Formation and Evolution of Planetary Systems*, ed. H.A. Weaver, F. Paresce, and L. Danly, p. 213-242. London: Cambridge University Press.

Peale, S.J., and Lissauer, J.J. (1989) Rotation of Halley's Comet. Icarus 79:396-430.

Shoemaker, C.S., and Shoemaker, E.M. (1990) Survey for Bright Trojan Asteroids (extended abstract). Lunar Planet. Sci. XXI:1152-1153.

Shoemaker, E.M., Shoemaker, C.S., and Wolfe, R.F. (1989) Trojan Asteroids, Populations, Dynamical Structure, and Origin of the L4 and L5 Swarms. In *Asteroids II*, ed. R.P. Binzel, M.S. Matthews, and T.S. Gehrels, p. 487-523. Tucson, Ariz.: University of Arizona Press.

Shoemaker, E.M., Shoemaker, C.S., Wolfe, R.F., and Holt, H.E. (1990) Earth-Crossing Asteroids, 1989 (extended abstract). Lunar Planet. Sci. XXI:1154-1156.

Sykes, M.V., Greenberg, R.J., Dermott, S.F., Nicholson, P.D., Burns, J.A., and Gautier, T.N. (1989) Dust Bands in the Asteroid Belt. In *Asteroids II*, ed. R.P. Binzel, M.S. Matthews, and T.S. Gehrels, p. 336-367. Tucson, Ariz.: University of Arizona Press.

Wetherill, G.W. (1989) Cratering of the Terrestrial Planets by Apollo Objects. Meteoritics 24:15-22.

Wetherill, G.W. (1989) Origin of the Asteroid Belt. In Asteroids II, ed. R.P. Binzel, M.S. Matthews, and T.S. Gehrels, p. 661-680. Tucson, Ariz.: University of Arizona Press.

Wetherill, G.W. (1989) Comments on Delivery of Asteroids and Meteorites to the Inner Solar System by R.G. Greenberg and M.C. Nolan. In *Asteroids II*, ed. R.P. Binzel, M.S. Matthews, and T.S. Gehrels, p. 801-804. Tucson, Ariz.: University of Arizona Press.

Wetherill, G.W. (1990) End Products of Cometary Evolution: Cometary Origin of Earth-Crossing Bodies of Asteroidal Appearance. In *Proceedings of I.A.U. Colloquium 116: Comets in the Post-Halley Era*, Bamberg, FRG, April 23-28,(1989) Dordrecht, The Netherlands: Kluwer Academic Publishers, in press.

Wolfe, R.F. (1990) Proposed New Asteroid Families. Lunar Planet. Sci. XXI:1349-1350.

Outer Planets, Satellites, and Rings

Araki, S. (1990) The Dynamics of Particle Disks III: Dense and Spinning Particles. Icarus, submitted

Brown, R.H., Johnson, T.V., Synnott, S., Anderson, J.D., Jacobson, R.A., Dermott, S.F., and Thomas, P.C. (1990) Physical Properties of the Uranian Satellites. In *Uranus*, ed. J.T. Bergstrahl, E.D. Miner, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press, in press.

Burns, J.A., and Kolvoord, R.A. (1989) Periodicities in Rings: Keeler Gap and Saturn's F Ring —or—Give Us Enough Variables and We Can Match Most Data. Bull. Am. Astron. Soc. 21:930.

Burns, J.A., Kolvoord, R.A., Hamilton, D.P., and Cuzzi, J.N. (1989) Theoretical/Observational Constraints on Particles Co-orbiting with Inner Saturnian Satellites. *Bull. Am. Astron. Soc.* 21:930.

Dermott, S.F., Malhotra, R., and Murray, C.D. (1988) Dynamics of the Uranian and Saturnian Satellite Systems: A Chotic Route to Melting Miranda. *Icarus* 76:295-334.

Dermott, S.F., and Thomas, P.C. (1988) The Shape and Internal Structure of Mimas. Icarus 73:25-65.

Dones, L., and Porco, C.C. (1989) Spiral Density Wakes in Saturn's A Ring (abstract). Bull. Am. Astron. Soc. 21:929.

Esposito, L.W., Brahic, A., Burns, J.A., and Marouf, E.A. (1990) Particle Properties and Processes in Uranus' Rings. In *Uranus*, ed. J.T. Bergstrahl, E.D. Miner, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press, in press.

Greenberg, R., et al. (1990) Miranda. In *Uranus*, ed. J.T. Bergstrahl, E.D. Miner, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press, in press.

Hubbard, W.B., Yelle, R.V., and Lunine, J.I. (1990) Nonisothermal Pluto Atmosphere Models. *Icarus*, in press.

Kary, D.M., Graps, A.L., Lissauer, J.J., and Showalter, M.R. (1989) Optical Depth Profiles of the Uranian Epsilon Ring from Voyager PPS Stellar Occultations. *Bull. Am. Astron. Soc.* 21:949.

Kolvoord, R.A., and Burns, J.A. (1989) Numerical Simulations of Narrow Planetary Rings: An Animation. Celestial Mechanics 45:321-322.

Lunine, J.I. (1989) Origin and Evolution of Outer Solar System Atmospheres. Science 245:141-147.

Lunine, J.I. (1989) The Urey Prize Lecture: Volatile Processes in the Outer Solar System. Icarus 81:1-13.

Lunine, J.I., and Rizk, B. (1989) Thermal Evolution of Titan's Atmosphere. Icarus 80:370-389.

Lunine, J.I. (1990) Titan. Adv. Space Res. 10:137-144.

Malhotra, R., Fox, K., Murray, C.D., and Nicholson, P.D. (1989) Secular Perturbations of the Uranian Satellites: Theory and Practice. Astron. Astrophys. 221:348-358.

Malhotra, R., and Dermott, S.F. (1990) The Role of Secondary Resonances in the Orbital History of Miranda. *Icarus*, in press.

Marley, M.S., Hubbard, W.B., and Porco, C.C. (1989) C Ring Features and f-Mode Oscillations of Saturn (abstract). Bull. Am. Astron. Soc. 21:928.

Marley, M.S., Hubbard, W.B., and Porco, C.C. (1989) Neptune Ring Arc Confinement and Planetary Oscillation Modes (abstract). Bull. Am. Astron. Soc. 21:913.

Ojakangas, G.W., and Stevenson, D.J. (1989) Polar Wander of an Ice Shell on Europa. Icarus 81:242-270.

Ojakangas, G.W., and Stevenson, D.J. (1989) Thermal State of an Ice Shell on Europa. Icarus 81:220-241.

Pollack, J.B., Lunine, J.I., and Tittemore, W.C. (1990) Origin of the Uranian Satellites. In *Uranus*, ed. J.T. Bergstrahl, E.D. Miner, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press, in press.

Porco, C.C. (1990) Narrow Rings: Observations and Theories. Adv. Space Res. 10:730-737.

Ross, M.N., and Schubert, G. (1989) Viscoelastic Models of Tidal Heating in Enceladus. Icarus 78:90-101.

Stansberry, J.A., Lunine, J.I., and Tomasko, M.G. (1989) Upper Limits on Possible Photochemical Hazes on Pluto. Geophys. Res. Lett. 16:1221-1224.

Yelle, R., and Lunine, J.I. (1989) Evidence for a Molecule Heavier Than Methane in Pluto's Atmosphere. *Nature* 339:288-290.

Photogrammetry, Geodesy, and Cartography

Basilevsky, A.T., Batson, R.M., and Burba, G.A. (1990) Pre-Magellan Mapping of Northern Venus: Completion of a Joint U.S./U.S.S.R. Mapping Project. Abstracts of Papers Submitted to the Twenty-First Lunar and Planetary Science Conference, p. 50-51. Houston, Tex.: Lunar and Planetary Institute.

Basilevsky, A.T., Burba, G.A., and Batson, R.M. (1989) Maps of Part of the Venus Northern Hemisphere: A Joint U.S./U.S.S.R. Mapping Project. Abstracts of Papers Submitted to the Twenty-First Lunar and Planetary Science Conference, p. 46-47. Houston, Tex.: Lunar and Planetary Institute.

Batson, R.M. (1989) Base Materials for Geological Mapping of the Planets. Geol. Soc. Am. Abs. 21(6):A109.

Batson, R.M. (1990) Cartography. In *Planetary Mapping*, ed. R. Greeley and R.M. Batson. London: Cambridge University Press, in press.

Batson, R.M., Bridges, P.M., Jordan, R., and Morgan, H.F. (1989) Topographic and Shaded Relief Maps of Part of the Northern Hemisphere of Venus. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 590. Washington, D.C.: National Aeronautics and Space Administration.

Batson, R.M., Edwards, K., and Duxbury, T.C. (1989) Mapping Irregular Satellites. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 592-598. Washington, D.C.: National Aeronautics and Space Administration.

Batson, R.M., and Inge, J.L., ed. (1990) Atlas of Mars: The Viking Global Survey. NASA SP-506. Washington, D.C.: U.S. Government Printing Office, in press.

Batson, R.M., and Morgan, H.F. (1989) Atlas of the Solar System. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 591. Washington, D.C.: National Aeronautics and Space Administration.

Bertolini, L., and McEwen, A. (1990) Digital Mosaic and Elevation Model of Central Valles Marineris, Mars. *Proceeding of the Lunar and Planetary Science Conference 21*, p.75-76. Houston, Tex.: Lunar and Planetary Institute.

Davies, M.E. (1989) The Control Network of Mars: February 1989. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 605-606. Washington, D.C.: National Aeronautics and Space Administration.

Davies, M.E. (1989) The Control Networks of the Satellites of Jupiter and Saturn. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 607-608. Washington, D.C.: National Aeronautics and Space Administration.

Davies, M.E., Batson, R.M., and Wu, S.S.C. Geodesy and Cartography. In Mars. Tucson, Ariz.: University of Arizona Press, in press.

Davies, M.E., Batson, R.M., and Wu, S.S.C. (1989) Geodesy and Cartography of Mars (abstract). In Fourth International Conference on Mars, Programs and Abstracts, p. 26-27. Tucson, Ariz.: University of Arizona Press.

Davies, M.E., Colvin, T.R., and Meyer, D.L. (1989) A Unified Lunar Control Network. In *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 602-604. Washington, D.C.: National Aeronautics and Space Administration.

Greeley, R., and Batson, R.M. ed. (1990) Planetary Mapping. London: Cambridge University Press, in press.

Tjuslin, Y.S., and Wu, S.S.C. (1989) The Development of Photogrammetric Research in the USA and the USSR for Topographic Mapping of Mars (abstract). In *Fourth International Conference on Mars, Programs and Abstracts*, p. 202-203. Tucson, Ariz.: University of Arizona Press.

Wu, S.S.C. (1989) Extraterrestrial Mapping. J. Surv. Eng. 2(2):40-48.

Wu, S.S.C., and Chavez, P.S. (1989) Radargrammetry and Its Possible Application to Sonar Imagery. In Seafloor Mapping Workshop, p. III-2.

Wu, S.S.C., and Doyle, J.F. (1989) Topographic Mapping. In Mapping the Planets and Satellites. Planetary Science Series. p. 169-207. London: Cambridge University Press.

Wu, S.S.C., Garcia, P.A., and Howington-Kraus, A.E. (1989) Quantitative Volumetric Analysis of Valles Marineris, Mars. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 534-536. Washington, D.C.: National Aeronautics and Space Administration.

Wu, S.S.C., Kim, Y., Garcia, P.A., and Howington-Kraus, A.E. (1989) Distortion in Lunar Orbiter Photographs. In *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 600. Washington, D.C.: National Aeronautics and Space Administration.

Wu, S.S.C., and Schafer, F.J. (1989) Photogrammetric Mapping of Ariel Using Voyager 2 Images. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 601. Washington, D.C.: National Aeronautics and Space Administration.

Wu, S.S.C., Schafer, F.J., Howington-Kraus, A.E., and Billideau, J.S. (1989) Publication of Mars Control Network. In *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 599. Washington, D.C.: National Aeronautics and Space Administration.

Geologic Mapping, Stratigraphy, and Geomorphology

Arvidson, R.E., Gooding, J.L., and Moore, H.J. (1989) The Martian Surface as Imaged, Sampled, and Analyzed by the Viking Landers. *Rev. Geophys.* 27:39-60.

Arvidson, R.E., Guinness, E.A., Dale-Bannister, M.A., Adams, J., Smith, M., Christensen, P.R., and Singer, R. (1989) Nature and Distribution of Surficial Deposits in Chryse Planitia and Vicinity, Mars. J. Geophys. Res. 94:1573-1587.

Bindschadler, D.L., Kreslavsky, M.A., Ivanov, M.A., Head, J.W., Basilevsky, A.T., and Shkuratov, Y.G. (1990) Distribution of Tessera Terrain on Venus: Predictions for Magellan. *Geophys. Res. Lett.* 17(2):171-174.

Chapman, M.G., and Tanaka, K.L. (1989) Geologic Mapping of Lower Mangala Valles, Mars: Evidence of Flooding, Sapping, Debris Flow, and Volcanism. Geol. Soc. Am. Abs. 21:A108. Also published in Proceedings of the Lunar and Planetary Science Conference 21, p. 179. Houston, Tex.: Lunar and Planetary Institute.

Chapman, M.G., and Scott, D.H. (1989) Geology and Hydrology of the North Kasei Valles Area, Mars. In *Proceedings of the Lunar and Planetary Science Conference 19*, p. 367-375. Houston, Tex.: Lunar and Planetary Institute.

Clark, P.E., and Hawke, B.R. (1989) The Lunar Farside Revisited: East of Smythii and Beyond. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 161-162. Houston, Tex.: Lunar and Planetary Institute.

Clark, P.E., Hawke, B.R., and Basu, A. (1990) The Relationship Between Orbital, Earth-Based, and Sample Data for Lunar Landing Sites. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 147-160. Houston, Tex.: Lunar and Planetary Institute.

Craddock, R.A., and Zimbelman, J.R. (1990) Bedrock Exposure in the Sinus Meridiani Region of Mars (abstract). *Trans. Am. Geophys. Union* 71(17):547.

Craddock, R.A., Zimbelman, J.R., and Greeley, R. (1990) Geologic History of the Southern Reaches of Mangala Valles. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 240-241. Houston, Tex.: Lunar and Planetary Institute.

Croft, S.K. (1990) Geologic Map of the Hebes Chasma Quadrangle, VM 500K 00077. In Reports of Planetary Geology and Geophysics Program—1989, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration, in press.

Croft, S.K. (1990) Triton: Geology and Geologic History. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 248-249. Houston, Tex.: Lunar and Planetary Institute.

Croft, S.K., and Soderblom, L.A. (1990) Geology of the Uranian Satellites. In *Uranus*, ed. J.T. Bergstrahl, E.D. Miner, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press, in press.

Crown, D.A., Price, K.H., and Greeley, R. (1990) Evolution of the East Rim of the Hellas Basin, Mars. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 252-253. Houston, Tex.: Lunar and Planetary Institute.

Crumpler, L.S., and Head, J.W. (1989) Divergent Plate Boundaries and Crustal Spreading on Venus: Evidence from Aphrodite Terra. In Abstracts for the Venus Tutorial and Venus Geologic Mapping Workshop, p. 50-51. Houston, Tex.: Lunar and Planetary Institute.

De Hon, R.A. (1989) Geologic Map of Maja Valles: MTM 20057; Northern Lunae Planum, Mars. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 232-233. Houston, Tex.: Lunar and Planetary Institute.

De Hon, R.A., Leith, A.C., and McKinnon, W.B. (1989) A Geologic Map and Photomosaic of Jg-15 Quadrangle of Ganymede. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 234-235. Houston, Tex.: Lunar and Planetary Institute.

Dimitriou, A.M. (1990) Minimum Estimates for Volume Removal from the Martian Fretted Terrain Between 270°W and 360°W. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 291-292. Houston, Tex.: Lunar and Planetary Institute.

Dimitriou, A.M. (1990) Stratigraphy of the Ismenius Lacus SE Subquadrangle: Clues to an Upland/Lowland Boundary-Forming Event? In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 293-294. Houston, Tex.: Lunar and Planetary Institute.

Gooding, J.L., ed. (1990) Scientific Guidelines for Preservation of Samples Collected from Mars, NASA TM-4184. Washington, D.C.: National Aeronautics and Space Administration.

Gooding, J.L., Carr, M.H., and McKay, C.P. (1989) The Case for Planetary Sample Return Missions. 2. History of Mars. EOS 70:745, 754-755.

Greeley, R., Spudis, P.D., and Guest, J.E. (1988) Geologic Map of the Ra Patera Area, Io (Ji2a). U.S. Geol. Surv. Misc. Invest. Series, Map I-1949.

Guest, J.E., Bianchi, R., and Greeley, R. (1988) Geologic Map of the Uruk Sulcus Quadrangle, Ganymede (Jg8). U.S. Geol. Surv. Misc. Invest. Series, Map I-1934.

Hawke, B.R., Spudis, P.D., Lucey, P.G., and Bell, J.F. (1990) The Composition of the Crust in the Orientale Region of the Moon: A Pre-Galileo View. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 473-474. Houston, Tex.: Lunar and Planetary Institute.

Head, J.W. (1989) Basic Assemblages of Geologic Units in the Venus Northern Hemisphere. In *Proceedings* of the Lunar and Planetary Science Conference 20, p. 392-393. Houston, Tex.: Lunar and Planetary Institute.

Head, J.W. (1990) Venus Crustal Formation and Evolution: An Analysis of Topography and Crustal Thickness Variations. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 477-478. Houston, Tex.: Lunar and Planetary Institute.

Head, J.W., and Crumpler, L.S. (1987) Evidence for Divergent Plate-Boundary Characteristics and Crustal Spreading on Venus. *Science* 238:1380-1385.

Head, J.W., and Crumpler, L.S. (1989) Divergent Plate Boundary Characteristics and Crustal Spreading in Aphrodite Terra, Venus: A Test of Some Predictions. Earth, Moon, and Planets 44:219-231.

Hood, L.L., and Williams, C.R. (1989) The Lunar Swirls: Distribution and Possible Origins. In *Proceedings* of the Conference on Lunar and Planetary Science 19, p. 99-113. Houston, Tex.: Lunar and Planetary Institute.

Howard, A.D. (1989) Miniature Analog of Spur-and-Gully Landforms in Valles Marineris Scarps (abstract). In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 355-357. Washington, D.C.: National Aeronautics and Space Administration.

Howard, A.D. (1989) Morphology of Planimetric Landforms (abstract). In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 313-315. Washington, D.C.: National Aeronautics and Space Administration.

Howard, A.D. (1989) Multivariate Characterization of Scarp Morphometry. In Abstracts of the 1989 Annual Meeting of the Association of American Geographers.

Howard, A.D. (1989) Simulation Models of Scarp and Valley Development (abstract). In Fourth International Conference on Mars. Tucson, Ariz.: University of Arizona Press.

Howard, A.D. (1989) Simulation Models of Scarp and Valley Development (abstract). In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 319-321. Washington, D.C.: National Aeronautics and Space Administration.

Komatsu, G., and Strom, R.G. (1990) Layered Deposits with Volcanic Intrusions in Gangis Chasma, Mars. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 651-652. Houston, Tex.: Lunar and Planetary Institute.

Kozak, R.C., and Schaber, G.G. (1989) Clotho Tessera, Venus: A Fragment of Fortuna Tessera? In Abstracts for the Venus Geoscience Tutorial and Geological Mapping Workshop, p. 41-42. Houston, Tex.: Lunar and Planetary Institute.

Malin, M.C. (1989) Rock Populations as Indicators of Geologic Processes. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 363. Washington, D.C.: National Aeronautics and Space Administration.

McEwen, A.S. (1989) Mobility of Large Rock Avalanches: Evidence from Valles Marineris, Mars. Geology 17:1111-1114.

McEwen, A.S., Lunine, J.I., and Carr, M.H. (1989) Dynamic Geophysics of Io. In *Time-Variable Phenomena* in the Jovian System, NASA SP-494, p. 11-46. Washington, D.C.: U.S. Government Printing Office.

Moore, H.J. (1987) Geologic Map of the Maasaw Patera Area, Io (Ji2c). U.S. Geol. Surv. Misc. Invest. Series, Map I-1851.

Moore, J.M. (1989) Erosional and Depositional Processes in the Martian Heavily Cratered Terrain. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 377-379. Washington, D.C.: National Aeronautics and Space Administration.

Murchie, S.L., and Head, J.W. (1989) Geologic Map of the Philus Sulcus Quadrangle, Ganymede (Jg4). U.S. Geol. Surv. Misc. Invest. Series, Map I-1934.

Murchie, S., Head, J.W., Plescia, J., and Helfenstein, P. (1986) Terrain Types and Local-Scale Stratigraphy of Grooved Terrain on Ganymede. J. Geophys. Res. 91:E222-E238.

Pozio, S., and Kargel, J.S. (1990) The Cratering Record and Geological History of Enceladus. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 975-976. Houston, Tex.: Lunar and Planetary Institute.

Ruff, S.W., and Greeley, R. (1990) Sinuous Ridges of the South Polar Region, Mars: Possible Origins. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1047-1048. Houston, Tex.: Lunar and Planetary Institute.

Schaber, G.G., and Kozak, R.C. (1990) Geologic/Geomorphic and Structural Maps of the Northern Quarter of Venus. U.S. Geol. Surv. Open-File Report 90-24.

Schaber, G.G., and Kozak, R.C. (1990) New USGS Open-File Geologic/Geomorphic and Tectonic Maps of the Northern Quarter of Venus. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1075-1076. Houston, Tex.: Lunar and Planetary Institute.

Schaber, G.G., Scott, D.H., and Greeley, R. (1989) Geologic Map of the Ruwa Patera Quadrangle of Io (Ji2). U.S. Geol. Surv. Misc. Invest. Series, Map I-1980.

Scott, D.H., and Chapman, M.G. (1989) Geologic Maps of Science Study Area 6, Mamnonia Region of Mars. U.S. Geol. Surv. Misc. Invest. Series, Map I-2084.

Scott, D.H., and Chapman, M.G. (1989) Kasei Valles, Mars: High-Resolution Geologic Observations. Geol. Soc. Am. Abs. Prog. 21(6):A108.

Scott, D.H., and Underwood, J.R. (1990) Mottled Terrain: A Continuing Martian Enigma (abstract). In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1117-1118. Houston, Tex.: Lunar and Planetary Institute.

Solomon, S.C. (1989) Lunar Geology: Ironing Out the Wrinkles. Nature 342:477-478.

Sotin, C., Senske, D.A., Head, J.W., and Parmentier, E.M. (1989) Terrestrial Spreading Centers under Venus Conditions: Evaluation of a Crustal Spreading Model for Western Aphrodite Terra. Earth and Planet. Sci. Lett. 95:321-333.

Spencer, J.R., and Fanale, F.P. (1990) New Models for the Origin of Valles Marineris Closed Depressions. J. Geophys. Res., in press.

Spudis, P.D. (1989) Geology of the Moon: Our Understanding 20 Years After Apollo 11. Geol. Soc. Am. Abs. Prog. 21(6):A121.

Spudis, P.D., Hawke, B.R., and Lucey, P.G. (1989) Geology and Deposits of the Lunar Nectaris Basin. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 561-562. Washington, D.C.: National Aeronautics and Space Administration.

Spudis, P.D., Hawke, B.R., and Lucey, P.G. (1989) The Lunar Crisium Basin: Geology, Rings, and Deposits. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 1042-1043. Houston, Tex.: Lunar and Planetary Institute.

Spudis, P.D., Hawke, B.R., and Lucey, P.G. (1989) The Lunar Crisium Basin: Geology, Rings, and Deposits. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 459-460. Washington, D.C.: National Aeronautics and Space Administration.

Stofan, E.R. (1989) Coronae on Venus: Observations and Models of Origin. Abstracts for the Venus Tutorial and Venus Geologic Mapping Workshop, p. 47-48. Tucson, Ariz.: University of Arizona Press.

Stofan, E.R., and Head, J.W. (1990) Coronae of Mnemosyne Regio: Morphology and Origin. *Icarus* 83:216-243.

Vorder Bruegge, R.W., and Head, J.W. (1990) Formation of Easter Ishtar Terra Venus: A Comparison of Models. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1282-1283. Houston, Tex.: Lunar and Planetary Institute.

Whitford-Stark, J.L., Mouginis-Mark, P.J., and Head, J.W. Geologic Map of the Lerna Region quadrangle, Io (Ji4). U.S. Geol. Surv. Misc. Invest. Series, Map I-2055, in press.

Zimbelman, J.R. (1989) Geologic Mapping of Southern Mangala Valles, Mars. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 578-579. Washington, D.C.: National Aeronautics and Space Administration.

Zimbelman, J.R. (1990) Geologic Mapping of Southern Mangala Valles, Mars. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 1373-1374. Houston, Tex.: Lunar and Planetary Institute.

Zimbelman, J.R. (1990) Preliminary Geologic Map of Central Mangala Valles, Mars. In *Reports of Planetary Geology and Geophysics Program—1989*, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration.

Zimbelman, J.R. (1990) Henry Crater, Mars: Thick Layered Deposit Preserved on a Crater Floor in the Martian Highlands (abstract). In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1375-1376. Houston, Tex.: Lunar and Planetary Institute.

Zimbelman, J.R., and Craddock, R.A. (1990) Bedrock Exposure in the Sinus Meridiani Region of the Martian Highlands. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1375-1376. Houston, Tex.: Lunar and Planetary Institute.

Zimbelman, J.R., and Craddock, R.A. (1990) An Evaluation of the Possible Extent of Bedrock Exposure in the Sinus Meridiani Region of the Martian Highlands (abstract). In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1377-1378. Houston, Tex.: Lunar and Planetary Institute.

Zimbelman, J.R., Craddock, R.A., and Greeley, R. (1990) Geologic Map of the South-Central Mangala Valles Region of Mars (MTM-15147). U.S. Geological Survey, in press.

Structure and Tectonics

Aubele, J.C. (1989) Morphological Components and Patterns in Wrinkle Ridges: Kinematic Implications. In MEVTV Workshop on Tectonic Features on Mars, LPI Tech. Rept. 89-06, ed. T.R. Watters and M.P. Golombek, p. 13-15. Houston, Tex.: Lunar and Planetary Institute.

Black, M.T., Zuber, M.T., and McAdoo, D.C. (1989) Comparison of Observed and Predicted Gravity Profiles over Aphrodite Terra, Venus (abstract). In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 82-83. Houston, Tex.: Lunar and Planetary Institute. Also in *J. Geophys. Res.*, submitted.

Burt, J.D., and Head, J.W. (1989) Tectonic Consequences of Three Venus Geotherms Applied to Subduction and Underthrusting. Bull. Am. Astron. Soc. 21:920.

Chadwick, D.J., Watters, T.R., and Tuttle, M.J. (1990) Crosscutting, Periodically Spaced Wrinkle Ridges of Hesperia Planum. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 175-176. Houston, Tex.: Lunar and Planetary Institute.

Craddock, R.A., Zimbelman, J.R., and Watters, T.R. (1990) Normal Faulting Associated with the Daedalia Impact Basin, Mars. In *MEVTV Workshop on Tectonic Features on Mars*, LPI Tech. Rept. 89-06, ed. T.R. Watters and M.P. Golombek, p. 18-20. Houston, Tex.: Lunar and Planetary Institute.

Croft, S.K. (1989) Spelunking on Mars: The Carbonate-Tectonic Hypothesis for the Origin of Valles Marineris. In *MEVTV Workshop on Tectonic Features on Mars*, LPI Tech. Rept. 89-06, ed. T.R. Watters and M.P. Golombek, p. 21-24. Houston, Tex.: Lunar and Planetary Institute.

Davis, P.A., and Golombek, M.P. Discontinuities on the Shallow Martian Crust at Lunai, Syria, and Sinai Plana. J. Geophys. Res., in press.

Davis, P.A., and Tanaka, K.L. (1990) Shallow Crustal Discontinuities in the Alba Patera-Tempe Terra Region of Mars. In Reports of Planetary Geology and Geophysics Program—1989, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration, in press.

deCharon, A.V., and Head, J.W. (1989) A First-Order Morphometric Comparison between Troughs of Laima Tessera, Venus and Earth's Oceanic Fracture Zones. *Bull. Am. Astron. Soc.* 21:921-922.

deCharon, A.V., and Head, J.W. (1990) Structure of Laima Tessera: Comparison with Earth's Oceanic Crust. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 262-263. Houston, Tex.: Lunar and Planetary Institute.

Frank, S.L., and Head, J.W. (1990) Styles of Compressional Deformation on Venus: Examples from Ridge Belts. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 387-388. Houston, Tex.: Lunar and Planetary Institute.

Golombek, M.P., Suppe, J., Narr, W., Plescia, J., and Banerdt, B. (1990) Does Wrinkle Ridge Formation on Mars Involve Most of the Lithosphere? In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 421-422. Houston, Tex.: Lunar and Planetary Institute.

Grimm, R.E., and Solomon, S.C. (1989) Test of Crustal Divergence Models for Aphrodite Terra, Venus. J. Geophys. Res. 94:12,103-12,131.

Head, J.W. (1990) Formation of Mountain Belts on Venus: Evidence for Large-Scale Convergence, Underthrusting, and Crustal Imbrication in Freyja Montes, Ishtar Terra. Geology 18:99-102.

Herrick, D.L., and Stevenson, D.J. (1990) Extensional and Compressional Instabilities in Icy Satellite Lithospheres. *Icarus* 85:191-204.

Hillgren, V.J., and Melosh, H.J. (1989) Crater Relaxation on Ganymede: Implications for Ice Rheology. Geophys. Res. Lett. 16:1339-1342.

Hillgren, V.J., and Melosh, H.J. (1989) The Importance of an Elastic Lithosphere for Crater Retention on Icy Bodies (abstract). In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 416-417. Houston, Tex.: Lunar and Planetary Institute.

Janes, D.M., and Melosh, H.J. (1990) Finite Element Modeling of Venusian Coronae (abstract). In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 559-560. Houston, Tex.: Lunar and Planetary Institute.

Lucchitta, B.K., and Bertolini, L.M. (1989) Interior Structures of Valles Marineris, Mars (abstract). In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 590-591. Houston, Tex.: Lunar and Planetary Institute.

Lucchitta, B.K., Clow, G.D., Croft, S.K., Geissler, P.E., McEwen, A.S., Singer, R.P., Squyres, S.W., and Tanaka, K.L. (1989) Canyon System on Mars. In *Fourth International Conference on Mars, Programs and Abstracts*, p. 36-37. Tucson, Ariz.: University of Arizona Press.

Lucchitta, B.K. (1990) Valles Marineris Mars: Are Pit Chains Formed by Erosion and Troughs by Tectonism? (abstract). In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 722-723. Houston, Tex.: Lunar and Planetary Institute.

MacKinnon, D.J., and Tanaka, K.L. (1989) The Impacted Martian Crust: Structure, Hydrology, and Some Geologic Implications. *J. Geophys. Res.* 94:17359-17370.

McGill, G.E., and Hills, L.S. (1990) Polygonal Terrane of Mars: Stresses from Drape Folding. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 763-764. Houston, Tex.: Lunar and Planetary Institute.

McKinnon, W.B., Benner, L.A.M., and Schenk, P.M. (1989) Icy Satellite Tectonics: Ariel, Tethys, and Ganymede. In *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 54-56. Washington, D.C.: National Aeronautics and Space Administration.

McKinnon, W.B. (1990) The Rheologies of Planetary Ices—Applications to the Tectonic and Volcanic Evolution of Icy Satellites. EOS 71:547.

Melosh, H.J. (1989) Stress and Strain in the Cascadia Subduction Zone (abstract). EOS 70:1332.

Melosh, H.J., and Williams, C.A. (1989) The Mechanics of Graben Formation in Crustal Rocks: A Finite Element Analysis. J. Geophys. Res. 94:13,961-13,973.

Melosh, H.J. (1990) The Mechanics of Low Angle Normal Faulting in the Basin Range. Nature 343:331-335.

Murchie, S. (1990) The Tectonics of Icy Satellites. Adv. Space Res. 10:173-182.

Murchie, S., Head, J., and Plescia, J. (1990) Tectonic and Volcanic Evolution of Dark Terrain and Its Implications for the Internal Structure of Ganymede. J. Geophys. Res., in press.

Scott, D.H. (1989) New Evidence—Old Problem: Wrinkle Ridge Origin (abstract). In MEVTV Workshop on Tectonic Features on Mars, p. 26-28.

Scott, D.H., and Dohm, J.M. (1989) Chronology and Global Distribution of Fault and Ridge Systems on Mars (abstract). In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 976-977. Houston, Tex.: Lunar and Planetary Institute.

Scott, D.H., and Dohm, J.M. (1990) Chronology and Global Distribution of Fault and Ridge Systems on Mars. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 487-501. Houston, Tex.: Lunar and Planetary Institute.

Scott, D.H., and Dohm, J.M. (1990) Faults and Ridges: Historical Development in Tempe Terra and Ulysses Patera Regions on Mars. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 505-513. Houston, Tex.: Lunar and Planetary Institute.

Senske, D.A. (1989) Distribution of Large Ring and Arcuate Structures in the Venus Equatorial Region. Bull. Am. Astron. Soc. 21:921.

Senske, D.A., Head, J.W., Stofan, E.R., and Campbell, D.B. (1990) Geology and Structure of Beta Regio: Results from New Arecibo Data. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1128-1129. Houston, Tex.: Lunar and Planetary Institute.

Sotin, C., and Murchie, S. (1988) Internal Dynamics of a Differentiated Ganymede: Constraints from Experimental Data. In *Proceedings of the Lunar and Planetary Science Conference 19*, p. 1107-1108. Houston, Tex.: Lunar and Planetary Institute.

Tanaka, K.L. (1990) Tectonic History of the Alba Patera-Ceraunius Fossae Region of Mars. In *Proceedings* of the Lunar and Planetary Science Conference 21, p. 515-523. Houston, Tex.: Lunar and Planetary Institute.

Vorder Bruegge, R.W., and Head, J.W. (1989) Eastern Ishtar Terra: Tectonic Evolution Derived from Recognized Features. In Abstracts for the Venus Tutorial and Venus Geologic Mapping Workshop, p. 50-51. Tucson, Ariz.: University of Arizona Press.

Watters, T.R. (1989) The Origin of Periodically Spaced Wrinkle Ridges on the Tharsis Plateau of Mars. Submitted to J. Geophys. Res. Special Issue on Martian Tectonism and Volcanism.

Watters, T.R. (1989) Periodically Spaced Anticlines of the Columbia Plateau. In Volcanism and Tectonism in the Columbia River Flood-Basalt Province, GSA Special Paper 239, ed. S.P. Reidel and P.R. Hooper, p. 283-292.

Watters, T.R. (1989) Periodically Spaced Wrinkle Ridges on the Tharsis Plateau of Mars. In Fourth International Conference on Mars, Program and Abstracts, p. 206-207. Tucson, Ariz.: University of Arizona Press.

Watters, T.R. (1990) The Nature and Origin of Periodically Spaced Wrinkle Ridges on Mars. In *Proceedings* of the Lunar and Planetary Science Conference 21, p. 1304-1305. Houston, Tex.: Lunar and Planetary Institute.

Watters, T.R., and Chadwick, D.J. (1989) Crosscutting Periodically Spaced First-Order Ridges in the Ridged Plains of Hesperia Planum: Another Case for a Buckling Model. In *MEVTV Workshop on Tectonic Features on Mars*, LPI Tech. Rept. 89-06, ed. T.R. Watters and M.P. Golombek, p. 68-70. Houston, Tex.: Lunar and Planetary Institute.

Watters, T.R., Chadwick, D.J., and Lui, M.C. (1990) Distribution of Strain in the Floor of the Olympus Mons Caldera. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1310-1311. Houston, Tex.: Lunar and Planetary Institute.

Watters, T.R., and Golombek, M.P., ed. (1989) MEVTV Workshop on Tectonic Features on Mars, LPI Tech. Rept. 89-06. Houston, Tex.: Lunar and Planetary Institute.

Watters, T.R., and Tuttle, M.J. (1989) Strike-Slip Faulting Associated with the Folded Columbia River Basalts: Implications for the Deformed Ridged Plains of Mars. In *MEVTV Workshop on Tectonic Features on Mars*, LPI Tech. Rept. 89-06, ed. T.R. Watters and M.P. Golombek, p. 71-73. Houston, Tex.: Lunar and Planetary Institute.

Watters, T.R., and Tuttle, M.J. (1990) Domains of Regional Pure Shear on the Terrestrial Planets. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1306-1307. Houston, Tex.: Lunar and Planetary Institute.

Watters, T.R., and Tuttle, M.J. (1990) Origin of Curvilinear Graben in Southwest Lunae Planum, Mars. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1308-1309. Houston, Tex.: Lunar and Planetary Institute.

Watters, T.R., Tuttle, M.J., and Kiger, F.J. (1990) Symmetry of Inferred Stress Fields in the Tharsis Region of Mars. In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1312-1313. Houston, Tex.: Lunar and Planetary Institute.

Watts, A.W., Greeley, R., and Melosh, H.J. (1989) The Formation of Antipodal Terrains on Icy Satellites (abstract). In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 1183-1184. Houston, Tex.: Lunar and Planetary Institute.

Whitford-Stark, J.L. (1990) The Volcanotectonic Evolution of Mare Frigoris. In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 175-185. London: Cambridge University Press.

Williams, D.R., and Greeley, R. (1989) Stress Distribution and Topography of Tellus Regio, Venus (abstract). In *Proceedings of Venus Geologic Mapping Workshop*, p. 52-53. Tucson, Ariz.: University of Arizona Press.

Williams, D.R., and Greeley, R. (1990) Stress Analysis of Tellus Regio, Venus, Based on Pioneer Venus Altimetry and Gravity Data and Comparison with Venera 15/16 Radar Images (abstract). In *Proceedings of the Lunar and Planetary Science Conference 21*, p. 1337-1338. Houston, Tex.: Lunar and Planetary Institute.

Zimbelman, J.R. (1989) Tectonic Influences on the Development of Mangala Valles, Mars. Trans. Am. Geophys. Union 70:388.

Zuber, M.T., and Aist, L.L. (1988) The Shallow Structure of the Martian Lithosphere in the Coprates and Lunae Planum Regions of Mars from the Geometries of Volcanic Plains Ridges (abstract). In MEVTV Workshop: Early Tectonic and Volcanic Evolution of Mars, p. 75-77. Houston, Tex.: Lunar and Planetary Institute.

Zuber, M.T., and Aist, L.L. (1989) The Shallow Structure of the Martian Lithosphere in the Vicinity of the Ridged Plains (abstract). In *Fourth International Conference on Mars, Program and Abstracts*, p. 215-216. Tucson, Ariz.: University of Arizona Press.

Zuber, M.T., and Aist, L.L. (1989) Lithospheric Control in the Development of the Martian Plains Ridges (abstract). In *Proceedings of the Lunar and Planetary Science Conference 20*, p. 1261-1262. Houston, Tex.: Lunar and Planetary Institute.

Zuber, M.T., and Aist, L.L. (1990) The Shallow Structure of the Martian Lithosphere in the Vicinity of the Ridged Plains. J. Geophys. Res., in press.

Zuber, M.T., and Parmentier, E.M. (1990) On the Relationship of Isostatic Topography and the Wavelengths of Tectonic Surface Features on Venus. *Icarus*, in press.

Volcanic Processes and Landforms

Arvidson, R.E., Campbell, D., Grimm, R., Phillips, R., and Schaber, G. (1990) On the Nature and Rate of Resurfacing on Venus. Geophys. Res. Lett., special Pre-Magellan issue, submitted.

Aubele, J.C., and Slyuta, E.N. (1989) Characteristics, Distribution, and Geologic/Terrain Associations of Small Dome-Like Hills on Venus (abstract). In Venus Geoscience Tutorial and Venus Geologic Mapping Workshop, p. 2-3; and Bull. Am. Astron. Soc. 21:921.

Aubele, J.C. (1990) Arecibo-Venera Comparison of Domes in Guinevere Planitia, Venus. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 30-31. Houston, Tex.: Lunar and Planetary Institute.

Aubele, J. (1990) Two Global Concentrations of Small Dome-Like Hills on Venus. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 32-33. Houston, Tex.: Lunar and Planetary Institute.

Carr, M.H. (1989) Martian Volcanism. Proc. 28th Intl. Geol. Congr. 1:243.

Condit, C.C., Crumpler, L.S., Aubele, J.C., and Elston, W.E. (1989) Patterns of Volcanism Along the southern Margin of the Colorado Plateau. J. Geophys. Res. 94:7975-7986.

Coombs, C.R., and Hawke, B.R. (1989) A Search for Intact Lava Tubes on the Moon. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 399-401. Washington, D.C.: National Aeronautics and Space Administration.

Coombs, C.R., and Hawke, B.R. (1989) Kauhako Crater and Channel, Kalaupapa, Molokai, Hawaii: A Terrestrial Analog to Lunar Sinuous Rilles. In *Proceedings of the Conference on Lunar and Planetary Science* 20, p. 183-184. Houston, Tex.: Lunar and Planetary Institute.

Coombs, C.R., and Hawke, B.R. (1989) Terrestrial Analogs to Lunar Sinuous Rilles: Kauhako Conduit System, Kalaupapa, Molokai, and Other Hawaiian Lava Channels. In *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 402-404. Washington, D.C.: National Aeronautics and Space Administration.

Coombs, C.R., and Hawke, B.R. (1990) Survey of Lunar Sinuous Rilles: The Search for Intact Lava Tubes. In Symposium on Lunar Bases and Space Activities of the 21st Century, in press.

Coombs, C.R., Hawke, B.R., and Wilson, L. (1990) Terrestrial Analogs to Lunar Sinuous Rilles: Kauhako Conduit System, Kalaupapa, Molokai, and Other Hawaiian Lava Channels. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 195-206. Houston, Tex.: Lunar and Planetary Institute.

Croft, S.K. (1990) Physical Cryovolcanism on Triton. In Proceedings of the Conference on Lunar and Planetary Science 21, p. 244-245. Houston, Tex.: Lunar and Planetary Institute.

Crown, D.A., and Greeley, R. (1990) Hadriaca Patera: Evidence for Pyroclastic Volcanism in the Hellas Region of Mars (abstract). In MEVTV Workshop on the Evolution of Magma Bodies on Mars. Houston, Tex.: Lunar and Planetary Institute, in press.

Crown, D.A., and Greeley, R. (1990) Styles of Volcanism, Tectonic Associations, and Evidence for Magma-Water Interactions in Eastern Hellas, Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 250-251. Houston, Tex.: Lunar and Planetary Institute.

Crumpler, L., and Aubele, J.C. (1989) Influence of Volcanic and Tectonic Stresses on the Flank Structure of Martian Volcanoes (abstract). In MEVTV Conference Abstracts, Richland, Wash., June 1989. Houston, Tex.: Lunar and Planetary Institute.

- Crumpler, L., et al. (1990) Calderas on Mars: Implications of Style and History for Subsurface Magmatism (abstract). In MEVTV Workshop on the Evolution of Magma Bodies on Mars, p. 14-15. Houston, Tex.: Lunar and Planetary Institute.
- Elston, W.E. (1989) Multilevel Plains Around Kane Patera, Io: Primary Pyroclastic Deposits, Not Mesa-Like Erosional Remnants (abstract). EOS 70:1185.
- Eppler, D.B., and Malin, M.C. (1989) The May 1915 Eruptions of Lassen Peak, California. I: Characteristics of Events on 19 May. In *Volcanic Hazards: Assessment and Monitoring*, ed. J. Latter, p. 180-200. Berlin: Springer-Verlag.
- Feng, M., Li, J., and Whitford-Stark, J.L. (1989) The Changbaishan Volcanoes of Eastern China. In Reports of Planetary Geology and Geophysics Program—1989, NASA TM-4210, p. 411-413. Washington, D.C.: National Aeronautics and Space Administration, in press.
- Gaddis, L.R., and Greeley, R. (1989) Evidence for Volcanism in NW Ishtar Terra, Venus (abstract). In Venus Geoscience Tutorial and Venus Geologic Mapping Workshop, p. 15-16. Houston, Tex.: Lunar and Planetary Institute.
- Geissler, P.E., Singer, R.B., and Lucchitta, B.K. (1990) Dark Materials in Valles Marineris: Indications of the Style of Volcanism and Magmatism on Mars. J. Geophys. Res., in press.
- Geissler, P.E., Singer, R.B., and Lucchitta, B.K. (1990) Dark Materials in Velles Marineris: Indications of the Style of Volcanism and Magmatism on Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 413-414. Houston, Tex.: Lunar and Planetary Institute.
- Greeley, R., and Crown, D.A. (1990) Volcanic Geology of Tyrrhena Patera, Mars. J. Geophys. Res. 95:7133-7149.
- Greeley, R., Lee, S.W., Crown, D.A., and Lancaster, N. (1990) Observations of Industrial Sulfur Flows: Implications for Io. *Icarus* 84:374-402.
- Hawke, B.R., Coombs, C.R., and Clark, B. (1989) Lunar Pyroclastic Deposits: An Important Resource. *The 1989 International Space Development Conference*, Chicago, Ill., May 26-29, 1989.
- Hawke, B.R., Coombs, C.R., and Clark, B. (1989) Pyroclastic Deposits: An Ideal Lunar Resource. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 389-390. Houston, Tex.: Lunar and Planetary Institute.
- Hawke, B.R., Coombs, C.R., and Clark, B. (1989) Lunar Pyroclastic Deposits: Their Resource Potential. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 396-399. Washington, D.C.: National Aeronautics and Space Administration.
- Hawke, B.R., Coombs, C.R., and Clark, B. (1990) Ilmenite-Rich Pyroclastic Deposits: An Ideal Lunar Resource. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 249-258. Houston, Tex.: Lunar and Planetary Institute.
- Head, J.W. (1989) Lava Flooding of Ancient Planetary Crusts: Geometry, Thickness, and Volumes of Flooded Lunar Impact Basins. *Moon and Planets* 26:61-88.
- Head, J., and Wilson, L. (1989) Basaltic Pyroclastic Eruptions: Influence of Gas Release Patterns and Volume Fluxes on Fountain Structure, and the Formation of Cinder Cones, Spatter Cones, Rootless Flows, Lava Ponds, and Lava Flows. J. Vol. Geotherm. Res. 37:261-271.
- Heslop, S.E., Wilson, L., Pinkerton, H., and Head, J.W. (1989) Dynamics of a Confined Lava Flow on Kilauea Volcano, Hawaii. *Bull. Volcan.* 51:415-432.

Kargel, J.S., and Strom, R.G. (1990) Cryovolcanism on Triton. In Proceedings of the Conference on Lunar and Planetary Science 21, p. 599-600. Houston, Tex.: Lunar and Planetary Institute.

Kirk, R.L. (1990) Thermal Models of Insolation-Driven Nitrogen Geysers on Triton (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 633-634. Houston, Tex.: Lunar and Planetary Institute.

Lucchitta, B.K. (1990) What if Deposits in the Valles Marineris are Volcanic? (abstract). In MEVTV Workshop on the Evolution of Magna Bodies on Mars, p. 29-30. Houston, Tex.: Lunar and Planetary Institute.

McEwen, A., Lunine, J., and Carr, M. (1989) Dynamic Geophysics of Io. In *Time-Variable Phenomena in the Jovian System*, NASA SP-494, p. 11-46. Washington, D.C.: U.S. Government Printing Office.

McEwen, A., and Malin, M. (1989) Dynamics of Mount St. Helens' 1980 Pyroclastic Flows, Rockslide-Avalanche, Lahars, and Blast. J. Vol. Geotherm. Res. 37:205-231.

McEwen, A. (1990) Io: Volcanism and Geophysics. Reference Encyclopedia of Astronomy and Astrophysics, in press.

McEwen, A.S., and Malin, M.C. (1989) Dynamics of Sediment Gravity Flows: Lahars, Avalanche, Pyroclastic Flows, and Blast Surge of Mount St. Helens. J. Volcan. Geotherm. Res. 37:205-231.

Melosh, H.J., and Janes, D.M. (1989) Ice Volcanism on Ariel. Science 245:195-196.

Moore, H.J., and Davis, P.A. (1990) Analyses and Morphology of a Lava Flow, Ascraeus Mons, Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 805-806. Houston, Tex.: Lunar and Planetary Institute.

Mouginis-Mark, P.J., Wilson, L., and Zuber, M.T. (1989) A Review of the Physical Volcanology of Mars (abstract). Fourth International Conference on Mars, p. 45-46.

Mouginis-Mark, P.J., Robinson, M.S., and Zuber, M.T. (1990) Evolution of the Olympus Mons Caldera, Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 815-816. Houston, Tex.: Lunar and Planetary Institute.

Mouginis-Mark, P.J., Robinson, M.S., and Hayashi-Smith, J. (1990) Topographic Measurements of Martian Volcanoes and Impact Craters. In Reports of Planetary Geology and Geophysics Program—1989, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration, in press.

Mouginis-Mark, P.J., Wilson, L., and Zuber, M.T. (1990) The Physical Volcanology of Mars. In Mars. Tucson, Ariz.: University of Arizona Press, in press.

Murchie, S., and Head, J.W. (1988) The Evolution of Volcanism on Ganymede: Possibility of a Low Melting-Point Volatile. In *Proceedings of the Conference on Lunar and Planetary Science 19*, p. 819-829. Houston, Tex.: Lunar and Planetary Institute.

Murchie, S. (1989) The Volcanic and Tectonic History of Ganymede. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 742-743. Houston, Tex.: Lunar and Planetary Institute.

Roberts, K.M., and Head, J.W. (1989) Lakshmi Planum: A Distinctive Highland Volcanic Province (abstract). In Venus Geoscience Tutorial and Venus Geologic Mapping Workshop, p. 37-38. Houston, Tex.: Lunar and Planetary Institute.

Roberts, K.M., and Head, J.W. (1990) Lakshmi Planum Volcanism: Basal Melting of Thickened Crust? In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1019-1020. Houston, Tex.: Lunar and Planetary Institute.

Schaber, G.G., and Kozak, R.C. (1989) Volcanism on Venus: Large Shields and Major Accumulations of Small "Domes" (abstract). In *Venus Geoscience Tutorial and Geologic Mapping Workshop*, p. 39-40. Houston, Tex.: Lunar and Planetary Institute.

Schaber, G.G. (1990) Volcanic Processes on Venus Inferred from Shield Morphometry. In *Proceedings of the Conference on Lunar and Planetary Science 21*. Houston, Tex.: Lunar and Planetary Institute.

Schneid, B.D., and Greeley, R. (1990) Relationships Between Volcanic Vents and Fractures Radial to Impact Basins on Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1415-1416. Houston, Tex.: Lunar and Planetary Institute.

Scott, D.H., and Dohm, J.M. (1990) Tectonic Setting of Martian Volcanoes and Deep-Seated Intrusives (abstract). In MEVTV Workshop on the Evolution of Magma Bodies on Mars, p. 39-40. Houston, Tex.: Lunar and Planetary Institute.

Spudis, P.D. (1990) Young Dark Mantle Deposits on the Moon. In Workshop on Lunar Volcanic Glasses: Scientific and Resource Potential, LPI Tech. Rept. 90-02, ed. J.W. Delano and G. Heiken, p. 60-61. Houston, Tex.: Lunar and Planetary Institute.

Spudis, P.D., Taylor, G.J., McCormick, K.A., Ryder, G., Keil, K., and Grieve, R.A.F. (1990) Clasts in Lunar Impact Melts and the Origin of Low-K Fra Mauro Basalt. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1188-1189. Houston, Tex.: Lunar and Planetary Institute.

Spudis, P.D., Taylor, G.J., McCormick, K.A., Ryder, G., Keil, K., and Grieve, R.A.F. (1990) Sources of Mineral Fragments in Impact Melts 15445 and 15455 and the Origin of Low-K Fra Mauro Basalt. In *Proceedings of the Conference on Lunar and Planetary Science 21*. Houston, Tex.: Lunar and Planetary Institute.

Turcotte, D.L. (1989) A Heat-Pipe Mechanism for Volcanism and Tectonics on Venus. J. Geophys. Res. 94:2779-2785.

Twist, D., and Elston, W.E. (1989) The Rooiberg Felsite (Bushveld Complex): Textural Evidence Pertaining to Emplacement of High-Temperature Siliceous Flows (abstract). In *Continental Magnatism*. International Association of Volcanology and Chemistry of the Earth's Interior. New Mexico Bureau of Mines and Mineral Resources Bulletin 131:274.

Whitford-Stark, J.L. (1990) Lunar Maria. In Magill's Survey of Science: Earth Science Series, p. 1408-1413.

Whitford-Stark, J.L. (1990) Volcanoes: Types of Eruption. In Magill's Survey of Science: Earth Science Series, p. 2695-2700.

Whitford-Stark, J.L. (1990) Volcanoes: Shield Volcanoes. In Magill's Survey of Science: Earth Science Series, p. 2681-2687.

Wilson, L., and Head, J.W. (1990) Ascent and Eruption of Magma on Mars: Theory and Observations. J. Geophys. Res.

Wilson, L., and Head, J.W. (1990) Factors Controlling the Structures of Magma Chambers in Basaltic Volcanos. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1343-1344. Houston, Tex.: Lunar and Planetary Institute.

Zuber, M.T., and Mouginis-Mark, P.J. (1990) Constraints on Magma Chamber Depth of the Olympus Mons Volcano Mars (abstract). In *MEVTV Workshop on the Evolution of Magma Bodies on Mars*, p. 45-46. Houston, Tex.: Lunar and Planetary Institute.

Zuber, M.T., and Mouginis-Mark, P.J. (1990) Constraints on the Depth and Geometry of the Magma Chamber of the Olympus Mons Volcano, Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1387-1388. Houston, Tex.: Lunar and Planetary Institute.

Aeolian Studies

Greeley, R., Lancaster, N., Gaddis, L., Rasmussen, K.R., White, B., and Iversen, J.D. (1989) Interactions Between Bed Topography and the Atmospheric Boundary Layer: Preliminary Results and Implications for Sediment Transport (abstract). EOS 70(43):1109.

Greeley, R., Lancaster, N., Lee, S., and Thomas, P. (1989) Martian Aeolian Processes, Sediments, and Features. In *Mars*. Tucson, Ariz.: University of Arizona Press, in press.

Kahn, R.A., Lee, S.W., Martin, T.Z., and Zurek, R.W. (1989) The Martian Dust Cycle. In *Mars*. Tucson, Ariz.: University of Arizona Press, in press.

Greeley, R., and Arvidson, R.E. (1990) Aeolian Processes on Venus. Earth, Moon, Planets, in press.

Greeley, R., and Williams, S.H. (1989) Wind Abrasion: Earth, Mars, and Venus. In *Proceedings of the 1988 Wind Erosion Conference*, Lubbock, Tex., p. 48-53.

Howard, A.D. (1990) Shape Variations in Barchan Dunes-A Simulation Approach (abstract). EOS 70:1110.

Iversen, J.D. (1989) Modelling Drift Geometry in Wind Tunnels. Spec. Rept. 89-6. U.S. Army Corps of Engineers, Cold Regions Research and Engineering Lab, Hanover, N.H.

Iversen, J.D., and Wong, W.P. (1990) Wind Tunnel Modelling of Time-Dependent Drift Topography. Amer. Soc. Civil Eng. Paper #CRE-91-261.

Lancaster, N. (1989) Eolian Deposition Patterns in Time and Space: Evidence from the Namib and Gran Desierto Sand Seas (abstract). In *Abstracts, 28th International Geological Congress 3*, Washington, D.C., p. 255-256.

Lancaster, N. (1989) Late Quaternary Paleoenvironments in the Southwestern Kalahari. *Palaeogeography, Palaeoclimatology, Palaeoecology* 70:367-376.

Lancaster, N. (1989) The Potential for Aeolian Activity in the Mojave and Sonoran Deserts: Evidence from Holocene Dune-Forming Episodes (abstract). Geol. Soc. Am. Abs. 21:A282.

Lancaster, N. (1989) Star Dunes. Prog. Phys. Geog. 13:67-92.

Lancaster, N. (1989) The Dynamics of Star Dunes: An Example from the Gran Desierto, Mexico. Sed. 36:273-290.

Lancaster, N. (1989) The Namib Sand Sea: Dune Forms, Processes and Sediments. Rotterdam: A.A. Balkema.

Leach, R., Greeley, R., and Pollack, J. (1989) Saltation Thresholds and Entrainment of Fine Particles at Earth and Martian Pressures, NASA TM-102193. Washington, D.C.: National Aeronautics and Space Administration.

Marshall, J.R., and Greeley, R. (1989) The Role of Fluid Density in the Development of Small-Scale Bedforms (abstract). EOS 70(43):1110.

White, B.R. (1990) Martian Dust Threshold Measurements: Simulation under Heated Surface Conditions. Final Report NASA IPA #NCA2-415.

Zimbelman, J.R. (1990) Outliers of Dust Along the Southern Margin of the Tharsis Region, Mars. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 525-530. Houston, Tex.: Lunar and Planetary Institute.

Fluvial Processes

Baker, V.R. (1989) Global Fluvial Paleohydrology (abstract). In Abstracts of the Second International Conference on Geomorphology, vol. 1, p. 16-17. Geoöko-Plus.

Baker, V.R. (1989) Understanding Floods (abstract). EOS 70(43):1003-1004.

Baker, V.R., and Gulick, V.C. (1989) Fluvial Processes: Toward a Martian Paradigm. In Reports of Planetary Geology and Geophysics Program-1988, NASA TM-4130, p. 316-318. Washington, D.C.: National Aeronautics and Space Administration.

Chapman, M.G., Scott, D.H., and Tanaka, K.L. (1990) Elysium Basin, Mars: Implications of a Deep, Intermittant Lake System (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 180-181. Houston, Tex.: Lunar and Planetary Institute.

Chapman, M.G., and Tanaka, K.L. (1990) Small Valleys and Hydrologic History of the Lower Mangala Valles Region, Mars. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 531-539. Houston, Tex.: Lunar and Planetary Institute.

Croft, S.K. (1990) Fire and Ice on Triton: Models for Cryovolcanism and Glaciology. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 244-245. Houston, Tex.: Lunar and Planetary Institute.

De Hon, R.A. (1989) Flood Surge in Martian Outflow Systems: Episodic Flow. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 230-231. Houston, Tex.: Lunar and Planetary Institute.

De Hon, R.A. (1989) Martian Lacustrine Plains. In Fourth International Conference on Mars, p. 90-91. Tucson, Ariz.: University of Arizona Press.

Gulick, V.C., and Baker, V.R. (1989) Fluvial Valleys and Martian Paleoclimates. Nature 341:514-516.

Gulick, V.C., and Baker, V.R. (1990) Valley Development on Mars: A Global Perspective (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 443-444. Houston, Tex.: Lunar and Planetary Institute.

Gulick, V.C., and Baker, V.R. (1990) Origin and Evolution of Valleys on Martian Volcanoes (abstract). EOS 71(13):364.

Howard, A.D. (1988) Groundwater Sapping Experiments and Modeling. In Sapping Features of the Colorado Plateau, NASA SP-491, ed. A.D. Howard, R.C. Kochel, and H.R. Holt, p. 71-83. Washington, D.C.: U.S. Government Printing Office.

Howard, A.D. (1988) Introduction: Groundwater Sapping on Mars and Earth. In Sapping Features of the Colorado Plateau, NASA SP-491, ed. A.D. Howard, R.C. Kochel, and H.R. Holt, p. 1-5. Washington, D.C.: U.S. Government Printing Office.

Howard, A.D., and Kochel, R.C. (1988) Introduction to Cuesta Landforms and Sapping Processes on the Colorado Plateau. In Sapping Features of the Colorado Plateau, NASA SP-491, ed. A.D. Howard, R.C. Kochel, and H.R. Holt, p. 6-56. Washington, D.C.: U.S. Government Printing Office.

Howard, A.D., and McLane, C.F. (1988) Erosion of Cohesionless Sediment by Groundwater Seepage. Water Resources Res. 24:1659-1674.

Howard, A.D. (1989) Case Study: Model Studies of Groundwater Sapping. In *Groundwater Geomorphology*, ed. C.G. Higgins. Geological Society of America Special Paper, in press.

Kargel, J.S., and Strom, R.G. (1990) Ancient Glaciation on Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 597-598. Houston, Tex.: Lunar and Planetary Institute.

Kochel, R.C., and Orbock Miller, S.M. (1989) Distinguishing the Morphology of Sapping and Runoff Dominated Valleys on Earth and Mars. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 307-309. Washington, D.C.: National Aeronautics and Space Administration.

Kochel, R.C., and Orbock Miller, S.M. (1989) Morphological Distinction of Sapping and Runoff Valley Networks on Earth and Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 526-527. Houston, Tex.: Lunar and Planetary Institute.

Kochel, R.C., and Miller, J.R. (1990) Post-Flooding Modifications to Chryse Basin Channels, Mars: Implications for Source Volumes and Evolution of the Channels. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 643-644. Houston, Tex.: Lunar and Planetary Institute.

Mouginis-Mark, P.J. (1990) Recent Water Release in the Tharsis Region of Mars. Icarus, in press.

Robinson, M.S., and Tanaka, K.L. (1990) Magnitude of a Catastrophic Flood Event at Kasei Valles, Mars. Geology, in press.

Scott, D.H., and Chapman, M.G. (1989) Geologic Setting of an Unusual Martian Channel: Hypotheses on Origin. In *Proceedings of the Conference on Lunar and Planetary Science 19*, p. 377-382. Houston, Tex.: Lunar and Planetary Institute.

Scott, D.H., and Dohm, J.M. (1990) Evidence for Multiple Flooding Episodes in Kasei Valles, Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1115-1116. Houston, Tex.: Lunar and Planetary Institute.

Scott, D.H., Tanaka, K.L., and Chapman, M.G. (1989) Water of the Elysium Basin, Mars: Volumetric Analysis and Sources (abstract). In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 331. Washington, D.C.: National Aeronautics and Space Administration.

Tanaka, K.L., and Chapman, M.G. (1990) The Relation of Flooding of Mangala Valles, Mars, to Faulting of Mamnonia Fossae and Tharsis Volcanism. *J. Geophys. Res.*, in press.

Impact Cratering Processes

Asphaug, E., Ryan, E., and Melosh, H.J. (1990) Two-Dimensional Fragmentation Hydrocode. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 28-29. Houston, Tex.: Lunar and Planetary Institute.

Benz, W., Cameron, A.G.W., and Melosh, H.J. (1989) The Origin of the Moon and the Single Impact Hypothesis III. *Icarus* 81:113-131.

Elston, W.E., and Twist, D. (1989) An Impact Interpretation of the Bushveld-Vredefort Complexes, South Africa. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 480-482. Washington, D.C.: National Aeronautics and Space Administration.

Elston, W.E., and Twist, D. (1989) Bushveld-Vredefort Enigma of South Africa and Recognition of Large Impact Structures: Mental Leaps and Mental Obstacles (abstract). In Abstracts of the 28th International Geological Congress, vol. 1, p. 449.

Finney, S.A., Tonks, W.B., and Melosh, H.J. (1989) Statistical Evolution of Impact Ejecta from Earth—Implications of Transfer to Other Solar System Bodies (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 287-288. Houston, Tex.: Lunar and Planetary Institute.

Hawke, B.R., Lucey, P.G., Spudis, P.D., and Owensby, P.D. (1989) Impact Structures as Crustal Probes: A Summary of Recent Progress. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 391. Houston, Tex.: Lunar and Planetary Institute.

Hayashi-Smith, J., and Mouginis-Mark, P.J. (1989) Morphometry of Fresh Impact Craters in Hesperia Planum, Mars. EOS 70:1179.

Hayashi-Smith, J., and Mouginis-Mark, P.J. (1990) Morphometry of Fresh Impact Craters in Hesperia Planum, Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 475-476. Houston, Tex.: Lunar and Planetary Institute.

Hood, L.L., and Huang, Z. (1989) Effects on Ambient Magnetic Fields and Plasmas of the Expanding Vapor Cloud Produced in Lunar Basin-Forming Impacts (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 422-423. Houston, Tex.: Lunar and Planetary Institute.

Hood, L.L. (1990) Magnetic Effects of Large-Scale Impacts on Airless Planetary Bodies. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 534-535. Houston, Tex.: Lunar and Planetary Institute.

Hood, L.L. (1990) Formation of Magnetic Anomalies Antipodal to Lunar Impact Basins: Two-Dimensional Model Calculations. *J. Geophys. Res.*, submitted.

McKinnon, W.B. (1989) Impact Jetting of Water Ice, with Application to the Accretion of Icy Planetesimals and Pluto. Geophys. Res. Lett. 16:1237-1240.

McKinnon, W.B. (1990) Impact Cratering. In Encyclopedia of Physical Sciences and Technology 1990 Yearbook, p. 363-371. San Diego: Academic Press.

Melosh, H.J. (1989) In Impact Cratering: A Geologic Process. Oxford University Press.

Melosh, H.J., and Kipp, M.E. (1989) Giant Impact Theory of the Moon's Origin: First 3-D Hydrocode Results (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 685-686. Houston, Tex.: Lunar and Planetary Institute.

- Melosh, H.J., and Vickery, A.M. (1989) Impact Erosion of the Primordial Atmosphere of Mars. Nature 338:487-489.
- Melosh, H.J., Schneider, N.M., Zahnle, K.J., and Latham, D. (1990) Ignition of Global Wildfires at the Cretaceous/Tertiary Boundary. *Nature* 343:251-254.
- Murchie, S., Head, J., and Efford, N. (1989) Morphologic Classes of Grooves on Phobos. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 744-745. Houston, Tex.: Lunar and Planetary Institute.
- O'Keefe, J.D., and Ahrens, T.J. (1989) Impact Produced Condensate and Droplet Size Distributions. *Icarus*, submitted.
- O'Keefe, J.D., and Ahrens, T.J. (1989) Planetary Impacts: The Effects of Gravity, Size, and Velocity on the Scaling of Crater Geometry and the Transition from Simple to Complex Craters. In *Proceedings of the Conference on Lunar and Planetary Science 20*. Houston, Tex.: Lunar and Planetary Institute.
- O'Keefe, J.D., and Ahrens, T.J. (1990) Large Scale Oblique Impacts on the Earth. In *Proceedings of the Conference on Lunar and Planetary Science 21*. Houston, Tex.: Lunar and Planetary Institute.
- Ryan, E.V., Davis, D.R., and Hartmann, W.K. (1990) Impact Experiments: Catastrophic Fragmentation of Aggregate Targets (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1055-1056. Houston, Tex.: Lunar and Planetary Institute.
- Schaber, G.G., Shoemaker, E.M., Shoemaker, C.S., and Kozak, R.C. (1989) Impact Cratering and the Surface Age of Venus: The Pre-Magellan Controversy. In Abstracts for the Venus Geoscience Tutorial and Geologic Mapping Workshop, LPI contribution 708, p. 41-42. Houston, Tex.: Lunar and Planetary Institute.
- Shoemaker, E.M., and Shoemaker, C.S. (1988) Impact Structures of Australia 1987 (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 19*, p. 1079-1080. Houston, Tex.: Lunar and Planetary Institute.
- Shoemaker, E.M., and Shoemaker, C.S. (1989) Geology of the Connolly Basin Impact Structure, Western Australia (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1008-1009. Houston, Tex.: Lunar and Planetary Institute.
- Shoemaker, E.M., Shoemaker, C.S., Nishiizumi, K., Kohl, C.P., Arnold, H.R., Klein, J., Fink, D., Middleton, R., Kubik, P.W., and Sharma, P. (1990) Ages of Australian Meteorite Craters—A Preliminary Report (abstract). *Meteoritics*, in press.
- Shoemaker, E.M., Shoemaker, C.S., and Plescia, J.B. (1989) Gravity Investigation of the Connolly Basin Impact Structure (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1010-1011. Houston, Tex.: Lunar and Planetary Institute.
- Strom, R.G., Croft, S.K., and Barlow, N.G. (1990) The Martian Impact Cratering Record. In Mars. Tucson, Ariz.: University of Arizona Press, in press.
- Strom, R.G., Croft, S.K., and Boyce, J.M. (1990) The Cratering Record on Triton. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1218-1219. Houston, Tex.: Lunar and Planetary Institute.
- Swindle, T., Spudis, P.D., Taylor, G.J., Korotev, R., Nichols, R.H., and Olinger, C.T. (1990) Searching for Crisium Basin Ejecta: Chemistry and Ages of Luna 20 Impact Melts. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1229-1230. Houston, Tex.: Lunar and Planetary Institute.
- Tonks, W.B., Melosh, H.J., and McKinnon, W.B. (1990) The Fate of Ejected Mercury Mantle Material from a Giant Impact. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1260-1261. Houston, Tex.: Lunar and Planetary Institute.

Vickery, A.M. (1989) Jetting and the Origin of Tektites (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1154-1155. Houston, Tex.: Lunar and Planetary Institute.

Wetherill, G.W. (1989) Cometary Cratering Rates on the Terrestrial Planets. Meteoritics 24:340.

Whitford-Stark, J.L. (1990) Lunar Craters. Magill's Survey of Science: Earth Science Series, p. 1393-1399.

Wilson, L., and Head, J. (1989) Dynamics of Groove Formation on Phobos by Ejecta from Stickney. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1211-1212. Houston, Tex.: Lunar and Planetary Institute.

Wilson, L., and Head, J.W. (1990) Dynamics of Groove Formation on Phobos by Ejecta from Stickney. J. Geophys. Res., submitted.

Yanagisawa, M., Eluszkiewicz, J., and Ahrens, T.J. (1990) Efficiency of Angular Momentum Transfer in Low Velocity Oblique Impacts. In *Proceedings of the Conference on Lunar and Planetary Science 21*. Houston, Tex.: Lunar and Planetary Institute.

Planetary Interiors and Petrology

Boslough, M.B., and Ahrens, T.J. (1989) A Sensitive Time-Resolved Radiation Pyrometer for Shock-Temperature Measurements Above 1500 K. Rev. Sci. Instrum. 60:3711-3716.

Dermott, S.F., and Thomas, P.C. (1990) Shapes, Masses, and Interiors of Satellites. Adv. Space Res. 10:165-172.

Hess, P.C., and Head, J.W. (1989) Derivation of Primary Magmas and Melting of Crustal Materials on Venus: Some Preliminary Considerations. In *Abstracts of the 28th International Geological Congress*, Washington, D.C., p. 55.

Hess, P.C., and Head, J.W. (1990) Spreading Center Processes Under Venus Conditions: Implications for Crustal Formation, Petrology, and Structure. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 503-504. Houston, Tex.: Lunar and Planetary Institute.

Hogenboom, D.L., and Kargel, J.S. (1990) Ammonia-Water Densities and Phase Relations to Four Kilobars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 522-523. Houston, Tex.: Lunar and Planetary Institute.

Kargel, J.S., Croft, S.K., Lunine, J.I., and Lewis, J.S. (1990) Rheological Properties of Ammonia-Water Liquids and Crystal-Liquid Slurries: Planetological Applications. *Icarus*, submitted.

Kirk, R.L., and Stevenson, D.J. (1989) The Competition Between Thermal Contraction and Differentiation in the Stress History of the Moon. J. Geophys. Res. 94:12133-12144.

Kirk, R.L., and Stevenson, D.J. (1989) Thermal Contraction, Differentiation, and the Stress History of the Moon. *Planetary Geosciences 1988*, NASA SP-498, p. 24-26. Washington, D.C.: U.S. Government Printing Office.

McGovern, P., and Schubert, G. (1989) Thermal Evolution of the Earth: Effects of Volatile Exchange between Atmosphere and Interior. Earth Planet. Sci. Lett. 96:27-37.

McGovern, P.J., and Solomon, S.C. (1989) Influence of Volatile Loss on the Mantle Temperature of Venus. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 669-670. Houston, Tex.: Lunar and Planetary Institute.

McGovern, P.J., and Solomon, S.C. (1989) Influence of Volatile Loss on the Mantle Temperature of Venus. In *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 143-145. Washington, D.C.: National Aeronautics and Space Administration.

McKinnon, W.B., and Benner, L.A.M. (1990) Triton's Post-Capture Thermal History. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 777-778. Houston, Tex.: Lunar and Planetary Institute.

McKinnon, W.B., and Mueller, S. (1989) The Density of Triton: A Prediction. Geophys. Res. Lett. 16:591-594.

Melosh, H.J., and Tonks, W.B. (1989) Giant Impacts, Global Magma Oceans, and Geochemical Differentiation: A View of the Earth's Early Thermal Regime. EOS 70:1000.

Ross, M.N., Schubert, G., Gaskell, R.W., and Spohn, T. (1990) Internal Structure of Io and the Global Distribution of Its Topography. *Icarus*, in press.

Schmitt, D.R., and Ahrens, T.J. (1989) Shock Temperatures in Silica Glass. J. Geophys. Res. 94:5851-5871.

Schubert, G., Bercovici, D., and Glatzmaier, G.A. (1990) Mantle Dynamics in Mars and Venus: Influence of an Immobile Lithosphere on Three-dimensional Mantle Convection. J. Geophys. Res., in press.

Schubert, G., Solomon, S.C., Turcotte, D.L., Drake, M.J., and Sleep, N.H. (1990) Origin and Thermal Evolution of Mars. In *Mars*, ed. H. Kieffer, B. Jakosky, C. Snyder, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press.

Schubert, G., and Spohn, T. (1990) Thermal History of Mars and the Sulfur Content of Its Core. J. Geophys. Res., in press.

Solomon, S.C., and Head, J.W. (1989) Estimating Lithospheric Thermal Gradient on Mars from Elastic Lithosphere Thickness: New Constraints on Heat Flow and Mantle Dynamics. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1030-1031. Houston, Tex.: Lunar and Planetary Institute. Also published in *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 203-205. Washington, D.C.: National Aeronautics and Space Administration.

Solomon, S.C., and Head, J.W. (1989) Heterogeneities in the Thickness of the Elastic Lithosphere of Mars: Constraints on Thermal Gradients, Crustal Thickness, and Internal Dynamics. In *MEVTV Workshop on Early Tectonic and Volcanic Evolution of Mars*, LPI Tech. Rept. 89-04, p. 76-78. Houston, Tex.: Lunar and Planetary Institute. Also in *J. Geophys. Res.*, in press.

Solomon, S.C., and Head, J.W. (1989) Lithospheric Flexure Beneath the Freyja Montes Foredeep, Venus: Constraints on Lithospheric Thermal Gradient and Heat Flow. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1032-1033. Houston, Tex.: Lunar and Planetary Institute. Also published in *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 43-45. Washington, D.C.: National Aeronautics and Space Administration.

Tan, H., and Ahrens, T.J. (1989) Shock-Induced Polymorphic Transition in Quartz, Carbon, and Boron Nitride. J. Appl. Phys. 67:217-224.

Tonks, W.B., and Melosh, H.J. (1989) Crystal Settling in a Vigorously Convecting Magma Ocean. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1124-1125. Houston, Tex.: Lunar and Planetary Institute.

Turcotte, D.L. (1989) Thermal Evolution of Mars and Venus Including Irreversible Fractionation. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1138-1139. Houston, Tex.: Lunar and Planetary Institute.

Tyburczy, J.A., and Ahrens, T.J. (1988) Dehydration Kinetics of Shocked Serpentine. In *Proceedings of the Conference on Lunar and Planetary Science 18*, p. 435-442. Houston, Tex.: Lunar and Planetary Institute.

Geochemistry: Regolith, Volatiles, and Atmospheres

- Ahrens, T.J., O'Keefe, J.D., and Lange, M.A. (1989) Formation of Planetary Atmospheres During Accretion. In *Origin and Evolution of Planetary and Satellite Atmospheres*, ed. S.K. Atreya, J.B. Pollock, and M.S. Matthews, p. 328-385. Tucson, Ariz.: University of Arizona Press.
- Baker, V.R., Strom, R.G., Croft, S.K., Gulick, V.C., Kargel, J.S., and Komatsu, G. (1990) Ancient Ocean-Land-Atmosphere Interactions on Mars: Global Model and Geological Evidence (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 40-41. Houston, Tex.: Lunar and Planetary Institute.
- Burns, R.G., and Fisher, D.S. (1989) Sulfide Mineralization Related to Early Crustal Evolution of Mars (abstract). In *MEVTV Workshop on Early Tectonic and Volcanic Evolution of Mars*, LPI Tech. Rept. 89-04, p. 20-22. Houston, Tex.: Lunar and Planetary Institute.
- Burns, R.G., and Fisher, D.S. (1989) Iron-Sulfur Mineralogy of Mars: Magmatic Evolution and Chemical Weathering Products (abstract). In *Fourth International Conference on Mars, Programs and Abstracts*, p. 75-76. Tucson, Ariz.: University of Arizona Press.
- Burns, R.G., Fisher, D.S., Bartels, K.S., and Straub, D.W. (1989) Characterization of Poorly Crystalline Iron Phases Resulting from Oxidation of Basaltic Minerals on Mars. EOS 70:378.
- Burns, R.G. (1990) Magmatic Sulfides on Mars (abstract). In MEVTV Workshop on Early Tectonic and Volcanic Evolution of Mars, LPI Tech. Rept. 89-04, p. 8-10. Houston, Tex.: Lunar and Planetary Institute.
- Burns, R.G., and Fisher, D.S. (1990) Chemical Evolution and Oxidative Weathering of Magmatic Iron Sulfides on Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 145-146. Houston, Tex.: Lunar and Planetary Institute.
- Carr, M.H. (1989) Recharge of the Early Atmosphere of Mars by Impact-Induced Release of CO₂. Icarus 79:311-327.
- Carr, M.H. (1989) Was the Early Atmosphere of Mars Sustained by Impact-Induced Release of CO₂? In Fourth International Conference on Mars, Programs and Abstracts, p. 77-78. Tucson, Ariz.: University of Arizona Press.
- Carr, M.H. (1990) The Effects of Floods, Volcanism, and Polar Processes on D/H in the Martian Atmosphere. In *Proceedings of the Conference on Lunar and Planetary Science 21*. Houston, Tex.: Lunar and Planetary Institute.
- Christensen, P.R., Moore, H.J., and Muhleman, D.O. (1990) *The Mars Subsurface Layer*. Tucson, Ariz.: University of Arizona Press, submitted.
- Fanale, F.P., and Postawko, S.E. (1990) Heat Flow vs. Atmospheric Greenhouse on Early Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 343-344. Houston, Tex.: Lunar and Planetary Institute.
- Fisher, D.S. (1990) Chemical Weathering of Sulfide Mineralization on Mars. Master's Thesis, Massachusetts Institute of Technology.
- Gooding, J.L. (1990) Estimates of Martian "Oxidant" Abundances in Sediment Samples at the Viking Landing Sites. In Reports of Planetary Geology and Geophysics Program—1989, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration.
- Gooding, J.L., Arvidson, R.E., and Zolotov, J. (1990) Physical and Chemical Weathering on Mars. In Mars, ed. H.H. Kiefer, B.M. Jakosky, and C.W. Snyder. Tucson, Ariz.: University of Arizona Press, in press.

Horstmann, K.C., and Melosh, H.J. (1989) Drainage Pits in Cohesionless Materials: Implications for the Surface of Phobos. J. Geophys. Res. 94:12433-12441.

Jones, T.D., Lebofsky, L.A., and Lewis, J.S. (1989) Asteroidal H₂O and the Hydration State of Terrestrial Planet Raw Materials. *EOS* 15:379.

Kirk, R.L. (1990) Diffusion Kinetics of Solid Methane and Nitrogen: Implications for Triton (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 631-632. Houston, Tex.: Lunar and Planetary Institute.

Lange, M.A., and Ahrens, T.J. (1989) Atmospheric Blow-Off During Accretion of the Terrestrial Planetary Atmospheres. *Icarus*, submitted.

Lebofsky, L.A., Jones, T.D., and Herbert, F. (1989) Asteroid Volatile Inventories. In *Origin and Evolution of Planetary and Satellite Atmospheres*, ed. S.K. Atreya, J.B. Pollack, and M.S. Matthews, p. 191-229. Tucson, Ariz.: University of Arizona Press.

McKay, D.S., Swindle, T.D., and Greenberg, R. (1989) Asteroidal Regoliths. In Asteroids II, ed. R.P. Binzel and T.S. Gehrels. Tucson, Ariz.: University of Arizona Press.

McKinnon, W.B. (1989) Who Made the Sky?: Review of "Origin and Evolution of Planetary and Satellite Atmospheres," ed. S.K. Atreya, et al. Nature 342:547.

Moore, H.J., and Keller, J.M. (1990) Surface Material Maps of Viking Landing Sites on Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 807-808. Houston, Tex.: Lunar and Planetary Institute.

Moore, J.M. (1989) Laboratory Studies of Sublimation in Ice/Silicate Mixtures. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 346-348. Washington, D.C.: National Aeronautics and Space Administration, in press.

Morris, R.V., Gooding, J.L., Lauer, H.V., and Singer, R.B. (1990) Iron Mineralogy of a Hawaiian Palagonitic Soil with Mars-Like Spectral and Magnetic Properties. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 811-812. Houston, Tex.: Lunar and Planetary Institute.

Musselwhite, D.S., and Lunine, J.I. (1990) Clathrate Storage of Volatiles on Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*. Houston, Tex.: Lunar and Planetary Institute.

O'Keefe, J.D., and Ahrens, T.J. (1989) Impact Production of CO₂ by the K-T Extinction Bolide and the Sudden Heating of the Earth. *Nature* 338:247-249.

Schubert, G., Turcotte, D.L., Solomon, S.C., and Sleep, N. (1989) Coupled Evolution of the Atmospheres and Interiors of Planets and Satellites. In *Origin and Evolution of Planetary and Satellite Atmospheres*, ed. S.K. Atreya, J.B. Pollack, and M.S. Matthews, p. 450-483. Tucson, Ariz.: University of Arizona Press.

Straub, D.W., and Burns, R.G. (1990) Ferrolysis of Iron-Bearing Martian Brines: Origin of Dust-Storm Particulates on Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1214-1215. Houston, Tex.: Lunar and Planetary Institute.

Vickery, A.M. (1990) Interaction Between Eject Vapor Plumes and Atmospheres, with Application to the KT Extinctions (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1270-1271. Houston, Tex.: Lunar and Planetary Institute.

Vickery, A.M., and Melosh, H.J. (1989) Atmospheric Erosion by Impacts: Evidence for an Early, Dense Atmosphere on Mars (abstract). EOS 10:1172.

Remote Sensing

Arvidson, R.E., and Evans, D. (1989) Geologic Remote Sensing Field Experiment. Geol. Soc. Am. Abs. Prog. A121.

Arvidson, R.E., Evans, D., and Shepard, M. (1990) Geologic Remote Sensing Field Experiment (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 26. Houston, Tex.: Lunar and Planetary Institute.

Campbell, B.A., Hawke, B.R., Bell, J.F. III, and Zisk, S.H. (1989) The Bessel Ray Region: Preliminary Analysis of Remote Sensing Data. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 139-140. Houston, Tex.: Lunar and Planetary Institute.

Coombs, C.R., and Hawke, B.R. (1989) Results of a Remote Sensing Analysis of the Alphonsus Crater Region. In *Reports of Planetary Geology and Geophysics Program—1988*, NASA TM-4130, p. 278-289. Washington, D.C.: National Aeronautics and Space Administration.

Coombs, C.R., Hawke, B.R., Lucey, P.G., and Head, J.W. (1989) Geologic and Remote Sensing Studies of the Alphonsus Crater Region. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 185-186. Houston, Tex.: Lunar and Planetary Institute.

Coombs, C.R., Hawke, B.R., Lucey, P.G., Owensby, P.D., and Zisk, S.H. (1990) The Alphonsus Region: A Geologic and Remote-Sensing Perspective. In *Proceedings of the Conference on Lunar and Planetary Science* 20, p. 161-174. Houston, Tex.: Lunar and Planetary Institute.

Crumpler, L., et al. (1990) Preliminary Analysis of Arsia Mons Geology as Characterized by Phobos 2 Termoskan Instrument. In Abstracts for MEVTV Workshop on Magma Bodies on Mars, p. 16-17. Houston, Tex.: Lunar and Planetary Institute.

Edgett, K.S., and Zimbelman, J.R. (1990) The Arsia Mons-Oti Fossai Thermal Anomaly: A Region with a Higher Thermal Inertia Than the Rest of Tharsis (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 315-316. Houston, Tex.: Lunar and Planetary Institute.

Guinness, E.A., and Arvidson, R.E. (1989) Evidence for Widespread Duricrust Substrate on Mars from Viking Orbiter Observations. Geol. Soc. Am. Abs. Prog. A180.

Guinness, E.A., and Arvidson, R.E. (1990) Evidence for Widespread Duricrust Substrate on Mars from Viking Imaging and Thermal Observations. J. Geophys. Res., in press.

Hawke, B.R., Coombs, C.R., and Lucey, P.G. (1989) A Remote Sensing Analysis of Crueger Crater and Vicinity on the Moon. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 281-283. Washington, D.C.: National Aeronautics and Space Administration.

Hawke, B.R., Lucey, P.G., Owensby, P.D., Zisk, S.H., Coombs, C.R., and Head, J.W. (1989) Remote Sensing Studies of the Alphonsus Region of the Lunar Central Highlands. *Bull. Am. Astron. Soc.* 9:970.

Lucey, P.G., and Hawke, B.R. (1989) Telescopic Thermal Infrared Measurements of the Silicate Mineralogy of Lunar Red Spots. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 596-597. Houston, Tex.: Lunar and Planetary Institute.

McKinnon, W.B. (1989) News and Views: Phobos 2 Encounter-Martian Surfaces Probed. Nature 341:565.

Petroy, S. (1989) Geologic Mapping of Surficial Materials in the Pisgah/Lavic Lake Area from Airborne TIMS and Landsat TM Images. Geol. Soc. Am. Abs. Prog. A180.

Williams, D.R., and Greeley, R. (1990) Stress Analysis of Tellus Regio, Venus, Based on Pioneer Venus Altimetry and Gravity Data and Comparison with Venera 15/16 Radar Images. In Reports of Planetary Geology and Geophysics Program—1989, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration.

Spectroscopy

Bartels, K.S., and Burns, R.G. (1989) Oxidized Olivines on Mars: Spectroscopic Investigations of Heat-Induced Aerial Oxidation Products. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 44-45. Houston, Tex.: Lunar and Planetary Institute.

Bell, J.F., Lucey, P.G., Gradie, J.C., Granahan, J.C., Tholen, D.J., Piscitelli, J.R., and Lebofsky, L.A. (1989) Reflectance Spectroscopy of Phobos and Deimos. *Bull. Am. Astron. Soc.* 21:991.

Bruno, B.C., Lucey, P.G., and Hawke, B.R. (1990) Preliminary Results of High Resolution UV-Visible Spectroscopy of Lunar Red Spots (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 139-140. Houston, Tex.: Lunar and Planetary Institute.

Burns, R.G. (1989) Olivine Alteration Phases in Shergottite ALHA 77005: Information from 4.2K Mossbauer Spectra. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 129-130. Houston, Tex.: Lunar and Planetary Institute.

Burns, R.G. (1989) Spectral Mineralogy of Terrestrial Planets: Scanning Their Surfaces Remotely. The 19th Hammond Lecture. *Mineralogical Magazine* 53:135-151.

Burns, R.G., and Martinez, S.L. (1990) Mossbauer Spectra of Olivine-Rich Weathered Acondrites: II. Brachina, Chassigny, ALHA 77005, and Nakhla. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 147-148. Houston, Tex.: Lunar and Planetary Institute.

Calvin, W.M. (1989) Additions and Corrections to the Absorption Coefficients of CO₂ Ice (abstract). Bull. Am. Astron. Soc. 21:978.

Calvin, W.M. (1989) Additions and Corrections to the Absorption Coefficients of CO₂ Ice: Applications to the Martian South Polar Cap. *Icarus*, in press.

Calvin, W.M., and King, T.V.V. (1990) Analysis of Mariner 6 and 7 Spectra for Weak Absorption Features from 2 to 6 μ m. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 153-154. Houston, Tex.: Lunar and Planetary Institute.

Clark, R.N., and Kierein, K.S. (1989) Reflectance Spectra of Mixtures as a Function of Grain Size and Viewing Geometry: Implications for Remote Sensing. *Icarus*, in press.

Clark, R.N., King, T.V.V., Klejwa, M., Swayze, G.A., and Vergo, N. (1989) High Spectral Resolution Reflectance Spectroscopy of Minerals. *J. Geophys. Res.*, in press.

Clark, R.N., Swayze, G.A., and Brown, R.H. (1989) Liquid Nitrogen: The Absorption Coefficient Spectrum 2.0-2.3 Microns. *Icarus*, in press.

Clark, R.N., Swayze, G.A., Singer, R.B., and Pollack, J.B. (1989) High Resolution Reflectance Spectra of Mars in the 2.3- μ m Region: Evidence for the Mineral Scapolite. *J. Geophys. Res.*, in press.

Clark, R.N., Swayze, G.A., Singer, R.B., and Pollack, J.B. (1989) Scapolite on Mars (abstract). Bull. Am. Astron. Soc. 21:955-960.

- Clark, R.N., Swayze, G.A., Singer, R.B., and Pollack, J.B. (1989) Scapolite on Mars. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 264-266. Washington, D.C.: National Aeronautics and Space Administration.
- Cloutis, E.A., Gaffey, M.J., Smith, D.G.W., and Lambert, R.J. (1990) Reflectance Spectra of Glass-Bearing Mafic Silicate Mixtures and Spectral Deconvolution Procedures. *Icarus*, in press.
- Cloutis, E.A., Gaffey, M.J., Smith, D.G.W., and Lambert, R.J. (1990) Reflectance Spectra of Mafic Silicate-Opaque Assemblages with Applications to Meteorite Spectra. *Icarus*, in press.
- Cloutis, E.A., Gaffey, M.J., Smith, D.G.W., and Lambert, R.J. (1990) Reflectance Spectra of "Featureless" Materials and the Surface Mineralogies of M- and E- Class Asteroids. J. Geophys. Res., in press.
- Cloutis, E.A., Gaffey, M.J., Smith, D.G.W., and Lambert, R.J. (1990) Metal-Silicate Mixtures: Spectral Properties and Applications to Asteroid Taxonomy. J. Geophys. Res., in press.
- Crown, D.A., Greeley, R., Sheridan, M.F., and Carrasco, R. (1989) Spectral and Morphologic Characteristics of Ignimbrites: The Frailes Formation, Bolivia. Bull. N.M. Bur. Mines Min. Res. 131:63.
- Farrand, W.H., and Singer, R.B. (1990) Analysis of Poorly Crystalline Clay Mineralogy: Near Infrared Spectrometry Versus X-Ray Diffraction (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 347-348. Houston, Tex.: Lunar and Planetary Institute.
- Fisher, D.S., and Burns, R.G. (1989) Acid Weathering on Mars: Spectroscopic Investigations of Sulfuric Acid-Degraded Olivines and Pyroxene. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 299-300. Houston, Tex.: Lunar and Planetary Institute.
- Geissler, P.E., Singer, R.B., and Lucchitta, B.K. (1989) Valles Marineris: Compositional Constraints from Viking Multispectral Images (abstract). In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 246. Washington, D.C.: National Aeronautics and Space Administration.
- Gooding, J.L., and Nash, D.B. (1990) Sulfur on Io: Calorimetric Analyses of Laboratory Analogs. In Reports of the Planetary Geology and Geophysics Program—1989, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration.
- Guinness, E.A., Arvidson, R.E., Irons, J., and Harding, D. (1990) Use of Aircraft Multispectral and Multiple Emission Angle Data to Determine Surface Roughness and Composition at the Lunar Lake Playa in Nevada (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 441-442. Houston, Tex.: Lunar and Planetary Institute.
- Hapke, B. (1990) Combined Theory of Reflectance and Emittance Spectroscopy. In Remote Geochemical Analyses, ed. C. Pieters and P. Englert. London: Cambridge University Press.
- Hawke, B.R., Coombs, C.R., Gaddis, L.R., Lucey, P.G., and Owensby, P.D. (1989) Spectral Reflectance Studies of Localized Dark Mantle Deposits on the Moon. In *Proceedings of the Conference on Lunar and Planetary Science 19*, p. 255-268. Houston, Tex.: Lunar and Planetary Institute.
- Holden, P.N., Gaffey, M.J., and Gaffey, S.J. (1989) In Situ Study of Organic Matter in Geologic Materials Using Near-UV, Visible, and Near-IR Reflectance Spectroscopy (0.3-3.0 \mu m) (abstract). EOS 70:352.
- Johnson, J.R., Larson, S.M., and Singer, R.B. (1990) Estimates of Lunar Mare Titanium and Ilmenite Abundances from CCD Imaging and Spectroscopy (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 457-458. Houston, Tex.: Lunar and Planetary Institute.

- Jurgens, R., Arvidson, R., et al. (1990) Radar Observations of Tinatin Planitia: Goldstone 1988 Observations of Venus (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 593-594. Houston, Tex.: Lunar and Planetary Institute.
- King, T.V.V., and Clark, R.N. (1989) Spectral Characteristics of Serpentines and Chlorites Using High Resolution Reflectance Spectroscopy. *J. Geophys. Res.* 94:13997-14008.
- Lebofsky, L.A., and Jones, T.D. (1989) The Nature of Low Albedo Asteroids from 3- μ m Multi-Color Photometry and Spectrophotometry. Bull. Am. Astron. Soc. 21:966.
- Lebofsky, L.A., and Jones, T.D. (1989) The Nature of Low Albedo Asteroids from 3- μ m Spectrophotometry. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 562-563. Houston, Tex.: Lunar and Planetary Institute.
- Lebofsky, L.A., Jones, T.D., Owensby, P.D., Feierberg, M.A., and Consolmagno, G.J. (1990) The Nature of Low Albedo Asteroids from 3-μm Spectrophotometry. *Icarus* 83:12-26.
- Lucey, P.G. (1990) Comparison of Thermal Emission Spectroscopic Measurements of the Lunar Surface (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 724-725. Houston, Tex.: Lunar and Planetary Institute.
- Lucey, P.G., Bruno, B.C., and Hawke, B.R. (1989) Imaging Spectroscopy of the Humorum Basin Region of the Moon. Bull. Am. Astron. Soc. 21:971.
- Lucey, P.G., Granahan, J., Nelson, M.L., and Hawke, B.R. (1989) A Spectral Mixing Model Approach to the Analysis of the Spectra of Lunar Soils (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 600-601. Houston, Tex.: Lunar and Planetary Institute.
- Lucey, P.G., and Hawke, B.R. (1989) Imaging Spectroscopy of the Central Highlands from 0.7 to 1.00 μ m (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 594-595. Houston, Tex.: Lunar and Planetary Institute.
- Lucey, P.G., and Hawke, B.R. (1989) Telescopic Thermal Infrared Measurements of the Silicate Mineralogy of Lunar Red Spots (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 596-597. Houston, Tex.: Lunar and Planetary Institute.
- Lucey, P.G., Hawke, B.R., and Bruno, B.C. (1989) Thermal Infrared Spectroscopy of the Moon. Bull. Am. Astron. Soc. 21:970.
- Lucey, P.G., Nelson, M., Granahan, J., and Hawke, B.R. (1989) The Dependence of Near-Infrared Spectral Parameters on Lunar Rock Type Composition (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 602-603. Houston, Tex.: Lunar and Planetary Institute.
- Lucey, P.G., Hawke, B.R., and Bruno, B.C. (1990) Preliminary Results of Imaging Spectroscopy of the Humorum Basin Region of the Moon (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 726-727. Houston, Tex.: Lunar and Planetary Institute.
- Martinez, S.L., and Burns, R.G. (1990) Mossbauer Spectra of Olivine-Rich Weathered Acondrites: I. Ureilites. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 736-737. Houston, Tex.: Lunar and Planetary Institute.
- Metzger, A.E. (1990) Gamma-Ray Differential Attention: A Means of Measuring Atmospheric Attenuation at Mars (abstract). Fourth International Conference on Mars, Programs and Abstracts, p. 144-145. Tucson, Ariz.: University of Arizona Press.

Metzger, A.E., and Haines, E.L. (1989) Gamma-Ray Methods for the Measurement of Atmospheric Thickness and Surface Pressure at Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 687-688. Houston, Tex.: Lunar and Planetary Institute.

Metzger, A.E., and Drake, D.M. (1990) The Identification of Lunar Rock Types and Search for Polar Ice by Gamma-Ray Spectroscopy. J. Geophys. Res. 95:449-460.

Morris, R.V., Gooding, J.L., Lauer, H.V., and Singer, R.B. (1990) Origins of the Mars-Like Spectral and Magnetic Properties of a Hawaiian Palagonitic soil. *J. Geophys. Res.*, in press.

Nash, D.B., and Salisbury, J.W. (1990) Infrared Reflectance Spectra of Plagioclase Feldspars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 845-846. Houston, Tex.: Lunar and Planetary Institute.

Nelson, R., Smythe, W., Hapke, B., and Cohen, A. (1990) On the Effect of X-Rays on the Color of Elemental Sulfur: Implications for Jupiter's Satellite Io. *Icarus*, in press.

Rousch, T.L., Blaney, D., and Singer, R.B. (1990) The Composition of Mars as Determined by Spectroscopic Observations. In *Remote Geochemical Analysis: Elemental and Mineralogical Composition*, ed. C. Pieters and P. Englert, in press.

Rousch, T.L., and Singer, R.B. (1990) Estimates of Absolute Flux and Radiance Factor of Localized Regions on Mars in the 2-4 μ m Wavelength Region (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1041-1042. Houston, Tex.: Lunar and Planetary Institute.

Salisbury, J.W., and Walter, L.S. (1989) Thermal Infrared (2.5 to 13.5 μ m) Spectroscopic Remote Sensing of Igneous Rock Type on Particulate Planetary Surfaces. J. Geophys. Res. 94:9192-9202.

Salisbury, J.W., Walter, L.S., and Vergo, N. (1989) Availability of a Library of Infrared (2.1 to 25.0 μ m) Mineral Spectra. Amer. Mineralog. 74:938-939.

Singer, R.B., Miller, J.S., Wells, W.K., and Bus, E.S. (1990) Visible and Near-IR Spectral Imaging of Mars During the 1988 Opposition. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1154-1155. Houston, Tex.: Lunar and Planetary Institute.

Solberg, T.C., and Burns, R.G. (1989) Iron Mossbauer Spectral Study of Weathered Antarctic and SNC Meteorites. In *Proceedings of the Conference on Lunar and Planetary Science 19*, p. 513-522. Houston, Tex.: Lunar and Planetary Institute.

Straub, D.W., and Burns, R.G. (1990) Oxidized Pyroxenes and Degradation of Their Visible-Near Infrared Spectra: Implications to Remote-Sensing of Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1216-1217. Houston, Tex.: Lunar and Planetary Institute.

Swayze, G.A., and Clark, R.N. (1989) Infrared Spectra and Crystal Chemistry of Scapolites: Implications for Martian Mineralogy. J. Geophys. Res., in press. Also published in Bull. Am. Astron. Soc. 21:955.

Vilas, F., and Gaffey, M.J. (1989) Identification of Phyllosilicate Absorption Features in Main-Belt and Outer-Belt Asteroid Reflectance Spectra. *Science* 246:790-792. Also published in *Bull. Am. Astron. Soc.* 21:966.

Vilas, F., and Gaffey, M.J. (1989) Weak Fe²⁺-Fe³⁺ Charge Transfer Absorption Features Seen in CM2 Carbonaceous Chondrites and Narrowband Reflectance Spectra of Primitive Asteroids (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1156-1157. Houston, Tex.: Lunar and Planetary Institute.

Walter, L.S., and Salisbury, J.W. (1989) Spectral Characterization of Igneous Rocks in the 8 to 12 μ m Region. J. Geophys. Res. 94:9203-9213.

Whitford-Stark, J.L. (1989) Application of Remote Sensing Techniques to Alkaline Volcanic Rocks: Trans-Pecos, Texas. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 1197-1198. Houston, Tex.: Lunar and Planetary Institute.

Photometry

Bell, J.F., Robinson, M.S., McCord, T.B., and Fanale, F.P. (1990) Comparison of New Groundbased and Phobos-2 VSK Color Ratio Data for Mars. In *Proceedings of the Conference on Lunar and Planetary Science* 21, p. 63-64. Houston, Tex.: Lunar and Planetary Institute.

Bowell, E., Hapke, B., Lumme, K., Harris, A., Domingue, D., and Peltoniemi, J. (1989) Application of Photometric Models to Asteroids. In *Asteroids II*, ed. T. Gehrels and M. Matthews, p. 524-556. Tucson, Ariz.: University of Arizona Press.

Campbell, B.A., Zisk, S.H., Bell, J.F., and Hawke, B.R. (1990) High-Resolution Remote Sensing Studies of Crater Ray Materials in Mare Screnitatis. In *Proceedings of the Conference on Lunar and Planetary Science* 21, p. 159-160. Houston, Tex.: Lunar and Planetary Institute.

Clancy, R.T., and Lee, S.W. (1990) Derivation of Mars Atmospheric Dust Opacities from Radiative Transfer Analysis of Viking IRTM Emission Phase Function Sequences (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 194-195. Houston, Tex.: Lunar and Planetary Institute.

Clark, R.N., Kierein, K.S., and Swayze, G.A. (1989) Experimental Verification of the Hapke Reflectance Theory 1: Computation of Reflectance as a Function of Grain Size and Wavelength Based on Optical Constants. *J. Geophys. Res.*, in press.

Domingue, D., Hapke, B., Lockwood, G., and Thompson, D. (1990) Europa's Phase Curve: Implications for Surface Structure. *Icarus*, in press.

Greeley, R., Lee, S.W., Crown, D.A., and Lancaster, N. (1989) Observations of Industrial Sulfur Flows: Implications for Io. *Icarus* 84:374-402.

Helfenstein, P., Veverka, J., and Simonelli, D. (1988) Io: A Comparison of Old and New Hapke Parameters from Voyager Disk-Integrated Photometry. In Reports of Planetary Geology and Geophysics Program—1987, NASA TM-4041. Washington, D.C.: National Aeronautics and Space Administration.

Helfenstein, P., Thomas, P.C., and Veverka, J. (1989) Evidence from Voyager II Photometry for Early Resurfacing of Umbriel. *Nature* 338:324-326.

Helfenstein, P., and Veverka, J. (1989) Physical Characterization of Asteroid Surfaces from Photometric Analysis. In *Asteroids II*, ed. T. Gehrels and M. Matthews, p. 524-593. Tucson, Ariz.: University of Arizona Press.

Helfenstein, P., Hillier, J., Weitz, C., and Veverka, J. (1990) Oberon: Color Photometry from Voyager and Its Geological Implications. *Icarus*, submitted.

Hillier, J., Helfenstein, P., and Veverka, J. (1989) Miranda: Color and Albedo Variations from Voyager Images. *Icarus* 82:314-335.

Lee, S.W., Clancy, R.T., and Bridges, N.T. (1989) Mars: Regional Photometric Studies from the Viking Orbiter IRTM (abstract). Bull. Am. Astron. Soc. 21:956.

Lee, S.W., and Clancy, R.T. (1990) The Effects of Atmospheric Dust on Observations of the Surface Albedo of Mars (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 688-689. Houston, Tex.: Lunar and Planetary Institute.

Magnusson, P., Barucci, M.A., Drummond, J., Lumme, K., Ostro, S., Surdej, J., Taylor, R., and Zappala, V. (1989) Determination of Asteroid Shapes and Pole Orientations. In *Asteroids II*, ed. R.P. Binzel, T. Gehrels, and M.S. Matthews, p. 66-97. Tucson, Ariz.: University of Arizona Press.

McEwen, A., and Lunine, J. (1990) Comment on "The Surface of Io: A New Model," by Bruce Hapke. *Icarus* 84:268-274.

McGuire, A., and Hapke, B. (1990) Light Scattering by Large, Irregular Particles. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 767-768. Houston, Tex.: Lunar and Planetary Institute.

Murchie, S., Britt, D., Head, J., Pratt, S., Fisher, P., Zhukov, B., Kuzmin, A., Ksanfomality, L., Nitikin, G., Zharkov, A., Fanale, F., Blaney, D., and Robinson, M. (1990) Color Variations on the Surface of Phobos and Their Relationship to Geologic Features. In *Proceedings of the Conference on Lunar and Planetary Science* 21, p. 825-826. Houston, Tex.: Lunar and Planetary Institute.

Ostro, S.J., Rosema, K.D., and Jurgens, R.F. (1990) The Shape of Eros. Icarus 84.

Plescia, J. (1990) Photoclinometric Analysis of Wrinkle Ridges on Lunae Planum. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 967-968. Houston, Tex.: Lunar and Planetary Institute.

Skypeck, A., Veverka, J., and Helfenstein, P. (1990) The Photometric Roughness of Ariel is Not Unusual. *Icarus*, submitted.

Thomas, P., Weitz, C., and Veverka, J. (1989) Small Satellites of Uranus: Disk-Integrated Photometry and Estimated Radii. *Icarus* 81:92-101.

Tittemore, W.C. (1990) Tidal Heating of Ariel. Icarus 88.

Verbiscer, A., and Veverka, J. (1989) Albedo Dichotomy of Rhea: Hapke Analysis of Voyager Photometry. *Icarus* 82:336-353.

Verbiscer, A., Helfenstein, P., and Veverka, J. (1990) Icy Satellites in the Outer Solar System: A Backscattering Frost Component? *Nature*, submitted.

Veverka, J., Helfenstein, P., Hapke, B., and Goguen, J. (1988) Photometry and Polarimetry of Mercury. In *Mercury*, ed. C. Chapman and M.S. Matthews. Tucson, Ariz.: University of Arizona Press.

Veverka, J., Brown, R.H., and Bell, J. (1990) Uranus Satellites: Surface Properties. In *Uranus*, ed. J.T. Bergstrahl, E.D. Miner, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press.

Radar

Arvidson, R.E., Plaut, J.J., Jurgens, R., Slade, M., and Saunders, R.S. (1990) Geology of Southern Guinevere Planitia, Venus, Based on Analyses of Goldstone Radar Data. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 557-572. Houston, Tex.: Lunar and Planetary Institute.

Campbell, D.B., Head, J.W., Hine, A.A., Harmon, J.K., Senske, D.A., and Fisher, P.C. (1989) Styles of Volcanism on Venus: New Arecibo High Resolution Radar Data. Science 246:373-377.

Campbell, B.A., and Campbell, D.B. (1990) Volcanic Deposits in Western Eisila Regio: Preliminary Results of Radar Polarization Studies. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 157-158. Houston, Tex.: Lunar and Planetary Institute.

Campbell, B.A., and Mouginis-Mark, P.J. (1990) High Resolution Radar Studies of Impact and Volcanic Phenomena on Venus and the Moon. In *Reports of Planetary Geology and Geophysics Program—1989*, NASA TM-4210. Washington, D.C.: National Aeronautics and Space Administration.

Gaddis, L.R., and Greeley, R. (1989) Radar Observations of Flow Textures and Aeolian Mantling Deposits at Pisgah Volcanic Field, CA. EOS 70(43):1183.

Gaddis, L.R., and Greeley, R. (1990) Aircraft Radar Analyses of Flow Textures and Aeolian Mantling Deposits, Pisgah, CA. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 397-398. Houston, Tex.: Lunar and Planetary Institute.

Gaddis, L.R., Mouginis-Mark, P., and Hayashi, J.N. (1990) Lava Flow Surface Textures: SIR-B Radar Image Texture, Field Observations, and Terrain Measurements. *Photogram. Eng. Remote Sensing* 56:211-224.

Gaddis, L.R., Mouginis-Mark, P., Singer, R., and Kaupp, V. (1989) Geologic Analyses of Shuttle Imaging Radar (SIR-B) Data of Kilauea Volcano, Hawaii. *Bull. Geol. Soc. Amer.* 101:317-332.

Greeley, R., Christensen, P., and Carrasco, R. (1989) Shuttle Radar Images of Wind Streaks in the Altiplano, Bolivia. Geology 17:665-668.

Hapke, B. (1990) Coherent Backscatter and the Radar Characteristics of Outer Planet Satellites. *Icarus*, in press.

Head, J.W., Campbell, D.B., Hine, A., and Fisher, P.C. (1989) Geological Analysis of New Arecibo Data in the Beta-Guinevere-Eisila and Themis-Lavina-Alpha Areas. Bull. Am. Astron. Soc. 21:19-920.

Hine, A.A., Campbell, D.B., Head, J.W., and Fisher, P.C. (1989) Venus: New Arecibo Radar Images. Bull. Am. Astron. Soc. 21:921.

Hudson, R.S., and Ostro, S.J. (1990) Doppler-Radar Imaging of Spherical Planetary Surfaces. J. Geophys. Res., in press.

Moore, H.J., and Thompson, T.W. (1989) A Radar-Echo Model for Mars. EOS 70(43):1183.

Petroy, S., and Arvidson, R.E. (1990) Spectral Emissivity of the Silver and Lunar Lake Playas—Relevance to Analyses of Mars TIR (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 952-953. Houston, Tex.: Lunar and Planetary Institute.

Plaut, J.J. (1989) Radar Scattering from Desert Terrains: Results from Airborne Multi-Frequency Polarimetry. Geol. Soc. Am. Abs. Prog. A180.

Plaut, J.J., Arvidson, R.E., and Jurgens, R. (1990) Heng-O Chasma and Its Radar Scattering Properties Based on Goldstone Venus Data. *Geophys. Res. Lett.*, special Pre-Magellan issue, submitted.

Plaut, J.J., and Jurgens, R. (1990) Radar Backscattering Behavior in the Equatorial Region of Venus—Goldstone Observations (abstract). In *Proceedings of the Conference on Lunar and Planetary Science* 21, p. 593-594. Houston, Tex.: Lunar and Planetary Institute.

Simpson, R.A., and Tyler, G.L. (1989) Numerical Modeling of Radiowave Scattering. In *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 296-298. Washington, D.C.: National Aeronautics and Space Administration.

Thompson, T.W., and Moore, H.J. (1990) A Radar-Echo Model for Mars. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1252-1253. Houston, Tex.: Lunar and Planetary Institute.

Zent, A.P., Fanale, F.P., and Roth, L.E. (1990) Possible Martian Brines: Radar Observations and Models. J. Geophys. Res., in press.

Planetary Dynamics and Cosmogony

Boss, A.P. (1989) Earth and Moon: Origins. In *Encyclopedia of Solid Earth Geophysics*, ed. D.E. James, p. 224-230. New York: Van Nostrand Reinhold.

Boss, A.P. (1989) Evolution of the Solar Nebula. I. Nonaxisymetric Structure During Nebula Formation. Astrophys. J. 345:554-571.

Boss, A.P. (1989) Low-Mass Star and Planet Formation. Pub. Astronom. Soc. Pacific 101:767-786.

Boss, A.P. (1989) Protostellar Formation in Rotating, Interstellar Clouds. VII. Inner Core Formation. Astrophys. J. 346:336-349.

Boss, A.P. (1989) Solar System: Origins. In Encyclopedia of Solid Earth Geophysics, ed. D.E. James. p. 1211-1217. New York: Van Nostrand Reinhold.

Boss, A.P. (1989) 3D Hydrodynamics and Radiative Transfer. Celestial Mechanics 45:85-88. Also published in Applications of Computer Technology to Dynamical Astronomy (IAU Colloquium 109), ed. J. Kovalevsky and P.K. Seidelmann. Dordrecht: Kluwer.

Boss, A.P., and Benz, W. (1989) Tidal Disruption of Inviscid Protoplanets (abstract). Bull. Am. Astron. Soc. 21:915.

Boss, A.P., Cameron, A.G.W., and Benz, W. (1990) Tidal Disruption of Inviscid Protoplanets (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 117-118. Houston, Tex.: Lunar and Planetary Institute.

Burns, J.A. (1990) Contradictory Clues as to the Origin of the Martian Satellites. In *Mars*, ed. H. Kieffer, B. Jakosky, C.W. Snyder, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press, in press.

Farinella, P., Paolicchi, P., Strom, R.G., Kargel, J.S., and Zappala, V. (1990) The Fate of Hyperion's Fragments. *Icarus* 83:186-204.

Froeschle, C., and Greenberg, R. (1989) Mean Motion Resonances. In *Asteroids II*, ed. R.P. Binzel, T. Gehrels, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press.

Greenberg, R., and Nolan, M. (1989) Delivery of Asteroids and Meteorites to the Inner Solar System. In Asteroids II, ed. R.P. Binzel, T. Gehrels, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press.

Greenzweig, Y., and Lissauer, J.J. (1989) Accretion Rates of Protoplanets in a Planetesimal Disk with Gaussian Velocity Dispersion. *Bull. Am. Astron. Soc.* 21:915.

Herbert, F., Sonett, C.P., and Gaffey, M.J. (1990) Protoplanetary Thermal Metamorphism: The Protosolar Wind Electromagnetic Induction Hypothesis. In *The Sun in Time*. Tucson, Ariz.: University of Arizona Press, in press.

Leith, A.C., and McKinnon, W.B. (1990) Orbital Evolution of a Triton Captured by Gas Drag. In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 692-693. Houston, Tex.: Lunar and Planetary Institute.

Lissauer, J.J., and Greenzweig, Y. (1989) Excitation of Eccentricities and Inclinations of Planetesimals by Protoplanets. Bull. Am. Astron. Soc. 21:1007.

Lissauer, J.J., and Greenzweig, Y. (1989) Growth Rates of Protoplanets. Bull. Am. Astron. Soc. 21:915.

Lunine, J.I., and Tittemore, W.C. (1990) Origin and Early Evolution of Planetary Satellites. In *Protostars and Planets III*, ed. E. Levy and J. Lunine. Tucson, Ariz.: University of Arizona Press.

McKinnon, W.B. (1989) Aspects of the Capture Origin of Triton. Bull. Am. Astron. Soc. 21:916.

McKinnon, W.B. (1989) News and Views: Electrically Heated Asteroids. Nature 340:343-344.

McKinnon, W.B. (1989) On the Origin of the Pluto-Charon Binary. Astrophys. J. (Lett.) 344:L41-L44; Erratum Astrophys. J. (Lett.) 346:L106.

McKinnon, W.B., Leith, A.C., and Mueller, S. Origin and Evolution of Pluto and Triton. In Reports of Planetary Geology and Geophysics Program—1988, NASA TM-4130, p. 57-59. Washington, D.C.: National Aeronautics and Space Administration.

Milani, A., Nobili, A.M., and Carpino, M. (1989) Dynamics of Pluto. Icarus 82:200-217.

Myhill, E.A., and Kaula, W.M. (1990) A Second Order Numerical Model of Protostellar Collapse and Nebula Formation. Bull. Am. Astron. Soc. 21(4).

Namiki, N., and Matsui, T. (1989) Numerical N-Body Simulation of the Accretion Process of the Terrestrial Planets. In *Proceedings of the Conference on Lunar and Planetary Science 20*, p. 758-759. Houston, Tex.: Lunar and Planetary Institute. Also published in *Reports of Planetary Geology and Geophysics Program*—1988, NASA TM-4130, p. 143-145. Washington, D.C.: National Aeronautics and Space Administration.

Nobili, A.M., and Burns, J.A. (1989) Solar System Chaos. Science 244:1425.

Ojakangas, G.W., and Greenberg, R. (1990) Viscosity and Mass Transport in Non-Uniform Keplerian Disks. *Icarus*, in press.

Pollack, J.B., Lunine, J.I., and Tittemore, W.C. (1990) Origins and Early Evolution of the Uranian Satellites. In *Uranus*, ed. J.T. Bergstrahl, E.D. Miner, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press.

Ross, M.N., and Schubert, G. (1989) Evolution of the Lunar Orbit with Temperature- and Frequency-Dependent Dissipation. J. Geophys. Res. 94:9533-9544.

Schubert, G., Turcotte, D.L., Solomon, S.C., Sleep, N.H., and Drake, M.J. (1989) Origin and Thermal Evolution of Mars. In Fourth International Conference on Mars: Program and Abstracts, p. 50-51. Tucson, Ariz.: University of Arizona Press.

Schubert, G., Solomon, S.C., Turcotte, D.L., Drake, M.J., and Sleep, N.H. Origin and Thermal Evolution of Mars. In *Mars*, ed. H. Kieffer, B. Jakosky, C.W. Snyder, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press, in press.

Stevenson, D.J. (1990) Chemical Heterogeneity and Imperfect Mixing in the Solar Nebula. Astrophys. J. 348:730-737.

Sykes, M.V., Greenberg, R., Dermott, S.F., Nicholson, P.D., Burns, J.A., and Gautier, T.N. (1989) Dust Bands in the Asteroid Belt. In *Asteroids II*, ed. R.P. Binzel, T. Gehrels, and M.S. Matthews. Tucson, Ariz.: University of Arizona Press.

Tittemore, W.C., and Wisdom, J. (1989) Tidal Evolution of the Uranian Satellites. II. An Explanation of the Anomalously High Orbital Inclination of Miranda. *Icarus* 78:63-89.

Tittemore, W.C. (1990) Tidal Heating of Ariel. Icarus 88, in press. Also published in Bull. Am. Astron. Soc. 21:92.

Tittemore, W.C., and Wisdom, J. (1990) Tidal Evolution of the Uranian Satellites. III. Evolution Through the Miranda-Umbriel 3:1, Miranda-Ariel 5:3, and Ariel-Umbriel 2:1 Mean-Motion Commensurabilities. *Icarus* 85.

Wetherill, G.W. (1989) The Formation of the Solar System: Consensus, Alternatives, and Missing Factors. In *The Formation of the Solar System*, ed. H.A. Weaver and L. Danly, p. 1-30. London: Cambridge University Press.

Wetherill, G.W. (1990) Formation of the Earth. Ann. Rev. Earth Planet. Sci. 18:205-256.

Wetherill, G.W. (1990) Formation of the Terrestrial Planets from Planetesimals. In *Proceedings of the Workshop on Planetary Science*, in press.

Wetherill, G.W. (1990) Runaway Planetesimal Growth: Agreement Between Analytical Solution of the Coagulation Equation and the Results of Numerical Physical Modelling (abstract). In *Proceedings of the Conference on Lunar and Planetary Science 21*, p. 1325-1326. Houston, Tex.: Lunar and Planetary Institute.

General Interest Topics

Arvidson, R.E. (1990) Planetary Geology. In Encyclopedia of Physical Science and Technology: 1990 Yearbook, p. 78-98. Academic Press.

Carr, M.H. (1989) Future Mars Exploration. In Proceedings of the 28th International Geology Congress 1:243.

Carr, M.H. (1990) Rational for a Mars Rover/Sample Return Mission. In *Proceedings on Exobiology in the Solar System*, in press.

Eliason, E.M., and McEwen, A.S. (1990) Adaptive Box Filters for Removal of Random Noise from Digital Images. *Photogram. Eng. Remote Sensing* 56:453-458.

Gooding, J.L., Carr, M.H., and McKay, C.P. (1989) The Case for Planetary Sample Return Missions. 2. History of Mars. EOS 70:745,754-755.

Melosh, H.J. (1990) Origin and Evolution of the Moon. In The Reference Encyclopedia of Astronomy and Astrophysics. New York: Van Nostrand Reinhold.

Rea, D.G., Carr, M.H., and Craig, M.K. (1989) The Case for a Multinational Mars Surveyor Program. *Planetary Report* 9(5):12-15.

Spudis, P.D. (1990) The Moon. In *The New Solar System*, 3rd Ed., ed. J.K. Beatty and A. Chaiken. Sky Publishing Corp. and Cambridge University Press, in press.

Taylor, G.J., and Spudis, P.D. (1989) Field Work on the Moon: Why We Need It and How To Do It. Geol. Soc. Am. Abs. Prog. 2(6):A302.

Taylor, G.J., and Spudis, P.D., eds. (1990) Geoscience and a Lunar Base: A Comprehensive Plan for Lunar Exploration, NASA CP-3070. Washington, D.C.: National Aeronautics and Space Administration.

Tonks, W.B., and Melosh, H.J. (1989) Mass Exchange Among the Terrestrial Planets: Implications for Life Exchange Between Earth and Mars (abstract). EOS 70:1173.

Whitford-Stark, J.L. (1990) A Quick and Dirty Way of Reading the Browse Files on the "Voyager to the Outer Planets" CD-ROM Disks on a MSDOS PC. In Reports of Planetary Geology and Geophysics Program—1990.

Author Index

Adams, J. 9	Chadwick, D.J. 14, 16
Ahrens, T.J. 28-33	Chapman, M.G. 9, 12, 25, 26
Aist, L.L. 17	Chavez, P.S. 8
Anderson, J.D. 5	Christensen, P.R. 9, 32, 41
Araki, S. 5	Clancy, R.T. 39, 40
Arnold, H.R. 28	Clark, B. 19
Arvidson, R.E. 9, 18, 23, 32, 34, 36, 40,	Clark, P.E. 9
	Clark, R.N. 35-39
41, 46 Asphaug, E. 27	Cloutis, E.A. 36
	Clow, G.D. 15
Aubele, J.C. 14, 18	
Baker, V.R. 25, 32	Cohen, A. 38
Banerdt, B. 14	Colvin, T.R. 7
Barlow, N.G. 28	Condit, C.C. 18
Bartels, K.S. 32, 35	Consolmagno, G.J. 37
Barucci, M.A. 40	Coombs, C.R. 18, 19, 34, 36
Basilevsky, A.T. 7, 9	Craddock, R.A. 9, 13, 14
Basu, A. 9	Craig, M.K. 46
Batson, R.M. 7	Croft, S.K. 9, 14, 15, 18, 25, 28, 30, 32
Bell, J.F. 3, 10, 34, 35, 39, 40	Crown, D.A. 9, 18, 19, 36, 39
Benner, L.A.M. 15, 30	Cruikshank, D.P. 3
Benz, W. 27, 43	Crumpler, L.S. 9, 10, 18, 19, 34
Bercovici, D. 31	Cuzzi, J.N. 5
Bertolini, L.M. 7, 15	Dale-Bannister, M.A. 9
Bianchi, R. 10	Davies, M.E. 7
Billideau, J.S. 8	Davis, D.R. 3, 28
Bindschadler, D.L. 9	Davis, P.A. 14, 20
Binzel, R.P. 3	De Hon, R.A. 10, 25
Black, M.T. 14	DeCharon, A.V. 14
Blaney, D. 38, 40	Dermott, S.F. 3-5, 30, 44
Boslough, M.B. 30	Di Martino, M. 3
Boss, A.P. 43	Dimitriou, A.M. 10
Bowell, E. 39	Dohm, J.M. 16, 21, 26
Boyce, J.M. 28	Domingue, D. 39
Brahic, A. 5	Dones, L. 5
Bridges, N.T. 39	Doyle, J.F. 8
Bridges, P.M. 7	Drake, D.M. 38
Britt, D. 40	Drake, M.J. 31, 44
Brown, R.H. 5, 35, 40	Drummond, J. 40
Bruno, B.C. 35, 37	Duxbury, T.C. 7
Burba, G.A. 7	Edgett, K.S. 34
Burns, J.A. 4, 5, 43, 44	Edwards, K. 7
	Efford, N. 28
Burns, R.G. 32, 33, 35-38	Eliason, E.M. 46
Burt, J.D. 14	
Bus, E.S. 38	Elston, W.E. 18, 19, 21, 27
Calvin, W.M. 35	Eluszkiewicz, J. 29
Cameron, A.G.W. 27, 43	Engel, S. 3
Campbell, B.A. 34, 39-41	Eppler, D.B. 19
Campbell, D.B. 16, 18, 40, 41	Esposito, L.W. 5
Carpino, M. 44	Evans, D. 34
Carr, M.H. 10, 11, 18, 20, 32, 46	Fanale, F.P. 3, 12, 32, 39, 40, 42
Carrasco, R. 36, 41	Farinella, P. 3, 43
Cellino, A. 3	Farrand, W.H. 36
Cerroni, P. 3	Feierberg, M.A. 37

Feng, M. 19	Holden, P.N. 36
Fink, D. 28	Holsapple, K. 3
Finney, S.A. 27	Holt, H.E. 4
Fisher, D.S. 32, 36	Hood, L.L. 10, 27
Fisher, P.C. 40, 41	Horstmann, K.C. 33
Fox, K. 5	Housen, K. 3
	Howard, A.D. 10, 11, 23, 25
Frank, S.L. 14	Howington-Kraus, A.E. 8
Froeschle, C. 43	
Fujiwara, A. 3	Huang, Z. 27
Gaddis, L.R. 19, 23, 36, 41	Hubbard, W.B. 5, 6
Gaffey, M.J. 3, 4, 36, 38, 43	Hudson, R.S. 41
Gaffey, S.J. 36	Inge, J.L. 7
Garcia, P.A. 8	Irons, J. 36
Gaskell, R.W. 30	Ivanov, M.A. 9
Gautier, T.N. 4, 44	Iversen, J.D. 23
Geissler, P.E. 15, 19, 36	Jacobson, R.A. 5
Glatzmaier, G.A. 31	Janes, D.M. 15, 20
Goguen, J. 40	Johnson, J.R. 36
Golombek, M.P. 14, 16	Johnson, T.V. 5
Gomes, R. 3	Jones, T.D. 33, 37
Gooding, J.L. 9, 10, 32, 33, 36, 38, 46	Jordan, R. 7
Gradie, J.C. 35	Jurgens, R. 36, 40, 41
Granahan, J.C. 35, 37	Kahn, R.A. 23
Graps, A.L. 5	Kargel, J.S. 11, 20, 26, 30, 32, 43
Greeley, R. 7, 9-13, 17-19, 21, 23, 35, 36,	Kary, D.M. 5
	Kaula, W.M. 44
39, 41	
Greenberg, R. 4, 5, 33, 43, 44	Kaupp, V. 41
Greenzweig, Y. 43	Keil, K. 21
Grieve, R.A.F. 21	Keller, J.M. 33
Grimm, R.E. 4, 14, 18	Kierein, K.S. 35, 39
Guest, J.E. 10	Kiger, F.J. 17
Guinness, E.A. 9, 34, 36	Kim, Y. 3, 8
Gulick, V.C. 25, 32	King, T.V.V. 35, 37
Haines, E.L. 38	Kipp, M.E. 27
Hamilton, D.P. 4, 5	Kirk, R.L. 20, 30, 33
Hapke, B. 36, 38-41	Klein, J. 28
Harding, D. 36	Klejwa, M. 35
Harmon, J.K. 40	Kochel, R.C. 25, 26
Harris, A. 39	Kohl, C.P. 28
Hartmann, W.K. 3, 28	Kolvoord, R.A. 5
Hawke, B.R. 9, 10, 12, 18, 19, 27, 34-37,	Komatsu, G. 11, 32
39	Korotev, R. 28
Hayashi, J.N. 41	Kozak, R.C. 11, 21, 28
Hayashi-Smith, J. 20, 27	Kreslavsky, M.A. 9
Head, J.W. 9-12, 14-16, 19-21, 28-31, 34,	Ksanfomality, L. 40
40, 41	Kubik, P.W. 28
Helfenstein, P. 11, 39, 40	Kuzmin, A. 40
Herbert, F. 33, 43	Lambert, R.J. 36
Herrick, D.L. 15	Lancaster, N. 19, 23, 39
Heslop, S.E. 19	Lange, M.A. 32, 33
Hess, P.C. 30	Larson, S.M. 36
Hillgren, V.J. 15	Latham, D. 28
Hillier, J. 39	Lauer, H.V. 33, 38
	Leach, R. 23
Hills, L.S. 15	Lebofsky, L.A. 33, 35, 37
Hine, A.A. 40, 41	
Hogenboom, D.L. 30	Lee, S.W. 19, 23, 39, 40

Leith, A.C. 10, 43, 44	Nelson, M.L. 37
Lewis, J.S. 3, 30, 33	Nelson, R. 38
Li, J. 19	Nichols, R.H. 28
Lipschutz, M.E. 4	Nicholson, P.D. 3-5, 44
Lissauer, J.J. 4, 5, 43	Nishiizumi, K. 28
Lockwood, G. 39	Nitikin, G. 40
Lucchitta, B.K. 15, 19, 20, 36	Nobili, A.M. 44
Lucey, P.G. 10, 12, 27, 34-37	Nolan, M. 43
Lui, M.C. 16	O'Keefe, J.D. 28, 32, 33
Lumme, K. 39, 40	Ojakangas, G.W. 6, 44
Lunine, J.I. 3-6, 11, 20, 30, 33, 40, 44	Olinger, C.T. 28
MacKinnon, D.J. 15	Orbock Miller, S.M. 26
Magnusson, P. 40	Ostro, S.J. 40, 41
Malhotra, R. 3, 5	Owensby, P.D. 27, 34, 36, 37
Malin, M.C. 11, 19, 20	
	Paolicchi, P. 3, 43
Marley, M.S. 5, 6	Parmentier, E.M. 12, 17
Marouf, E.A. 5	Peale, S.J. 4
Marshall, J.R. 23	Pellas, P. 4
Martin, T.Z. 23	Peltoniemi, J. 39
Martinez, S.L. 35, 37	Petroy, S. 34, 41
Matsui, T. 44	Phillips, R. 18
McAdoo, D.C. 14	Pinkerton, H. 19
McCord, T.B. 39	Piscitelli, J.R. 35
McCormick, K.A. 21	Plaut, J.J. 40, 41
McEwen, A.S. 7, 11, 15, 20, 40, 46	Plescia, J. 11, 14, 15, 28, 40
McGill, G.E. 15	Pollack, J.B. 6, 23, 35, 36, 44
McGovern, P.J. 30	Porco, C.C. 5, 6
McGuire, A. 40	Postawko, S.E. 32
McKay, C.P. 10, 46	Pozio, S. 11
McKay, D.S. 33	Pratt, S. 40
McKinnon, W.B. 10, 15, 27, 28, 30, 33,	Price, K.H. 9
34, 43, 44	Rasmussen, K.R. 23
McLane, C.F. 25	Rea, D.G. 46
McSween, H.Y., Jr. 4	Rizk, B. 5
Melosh, H.J. 15, 17, 20, 27, 28, 30, 31, 33,	Roberts, K.M. 20, 21
46	Robinson, M.S. 20, 26, 39, 40
Metzger, A.E. 37, 38	Rosema, K.D. 40
Meyer, D.L. 7	Ross, M.N. 6, 30, 44
Middleton, R. 28	Roth, L.E. 42
Milani, A. 44	Rousch, T.L. 38
Miller, J.R. 26	Ruff, S.W. 11
Miller, J.S. 38	Ryan, E.V. 3, 27, 28
Moore, H.J. 9, 11, 20, 32, 33, 41, 42	Ryder, G. 21
Moore, J.M. 11, 33	Salisbury, J.W. 38, 39
Morgan, H.F. 7	Salvail, J.R. 3
Morris, R.V. 33, 38	Saunders, R.S. 40
Mouginis-Mark, P.J. 12, 20, 22, 26, 27, 41	Schaber, G.G. 11, 12, 18, 21, 28
Mueller, S. 30, 44	Schafer, F.J. 8
Muhleman, D.O. 32	Schenk, P.M. 15
Murchie, S. 11, 15, 16, 20, 28, 40	Schmitt, D.R. 30
Murray, C.D. 5	Schneid, B.D. 21
Musselwhite, D.S. 33	Schneider, N.M. 28
Myhill, E.A. 44	Schubert, G. 6, 30, 31, 33, 44
Namiki, N. 44	Scott, D.H. 9, 12, 15, 16, 21, 25, 26
Narr, W. 14	Senske, D.A. 12, 16, 40
Nash, D.B. 36, 38	
11a31i, D.D. 50, 50	Sharma, P. 28

Shepard, M. 34 Sheridan, M.F. 36 Shkuratov, Y.G. 9 Shoemaker, C.S. 4, 28 Shoemaker, E.M. 4, 28 Showalter, M.R. 5 Simonelli, D. 39 Simpson, R.A. 41 Singer, R. 9, 41 Singer, R.B. 19, 33, 35, 36, 38 Singer, R.P. 15 Skypeck, A. 40 Slade, M. 40 Sleep, N.H. 31, 33, 44 Slyuta, E.N. 18 Smith, M. 9 Smith, D.G.W. 36 Smythe, W. 38 Soderblom, L.A. 9 Solberg, T.C. 38 Solomon, S.C. 12, 14, 30, 31, 33, 44 Sonett, C.P. 43 Sotin, C. 12, 16 Spencer, J.R. 12 Spohn, T. 30, 31 Spudis, P.D. 10, 12, 21, 27, 28, 46 Squyres, S.W. 15 Stansberry, J.A. 6 Stevenson, D.J. 6, 15, 30, 44 Stofan, E.R. 12, 16 Straub, D.W. 32, 33, 38 Strom, R.G. 11, 20, 26, 28, 32, 43 Suppe, J. 14 Surdei, J. 40 Swayze, G.A. 35, 36, 38, 39 Swindle, T.D. 28, 33 Sykes, M.V. 4, 44 Synnott, S. 5 Tan, H. 31 Tanaka, K.L. 9, 14-16, 25, 26 Taylor, G.J. 21, 28, 46 Taylor, R. 40 Tedesco, E. 3 Tholen, D.J. 35 Thomas, P.C. 5, 23, 30, 39, 40 Thompson, D. 39 Thompson, T.W. 41, 42 Tittemore, W.C. 6, 40, 44, 45 Tjuflin, Y.S. 8 Tomasko, M.G. 6 Tonks, W.B. 27, 28, 30, 31, 46 Turcotte, D.L. 21, 31, 33, 44 Tuttle, M.J. 14, 17 Twist, D. 21, 27 Tyburczy, J.A. 31 Tyler, G.L. 41

Underwood, J.R. 12 Verbiscer, A. 40 Vergo, N. 35, 38 Veverka, J. 39, 40 Vickery, A.M. 28, 29, 33 Vilas, F. 38 Vorder Bruegge, R.W. 12, 16 Walter, L.S. 38, 39 Watters, T.R. 14, 16, 17 Watts, A.W. 17 Weidenschilling, S.J. 3 Weitz, C. 39, 40 Wells, W.K. 38 Wetherill, G.W. 4, 29, 45 White, B.R. 23 Whitford-Stark, J.L. 12, 17, 19, 21, 29, 39, Williams, C.A. 15 Williams, C.R. 10 Williams, D.R. 17, 35 Williams, S.H. 23 Wilson, L. 18-21, 29 Wisdom, J. 44, 45 Wolfe, R.F. 4 Wolven, B. 3 Wong, W.P. 23 Wu, S.S.C. 7, 8 Yanagisawa, M. 29 Yelle, R.V. 5, 6 Zahnle, K.J. 28 Zappala, V. 3, 40, 43 Zent, A.P. 42 Zharkov, A. 40 Zhukov, B. 40 Zimbelman, J.R. 9, 12-14, 17, 24, 34 Zisk, S.H. 34, 39 Zolotov, J. 32 Zuber, M.T. 14, 17, 20, 22 Zurek, R.W. 23

National Aeronaulos and Space Administration	Report Docum	entation Page)	
1. Report No. NASA TM-4221	2. Government Accessi	on No.	3. Recipient's Catalo	og No.
4. Title and Subtitle A Bibliography of Planeta Principal Investigators a	ry Geology and G	eophysics	5. Report Date December 1	990
1989-1990	nd Their Associa	tes,	6. Performing Organ	nization Code
7. Author(s)			8. Performing Organ	nization Report No.
			10. Work Unit No.	
 Performing Organization Name and Address NASA Office of Space Science 		ions	11. Contract or Grant	t No.
12. Sponsoring Agency Name and Address			13. Type of Report a	
National Aeronautics and Washington, DC 20546	Space Administra	tion	14. Sponsoring Agen	cy Code
Companion to NASA TM-4210 Program-1989 16. Abstract This document is a compil specifically relating to principal investigators at the NASA Office of Space Exploration Division, Plan	ation of selecter recent publication nd their association	d bibliographions submitted l tes, supported ications, Solan	c data Dy through r System	.5
17. Key Words (Suggested by Author(s))		18. Distribution Staten	nent	- · · ·
planetary geology and geop bibliography solar system	physics	Unclassified		
19. Security Classif. (of this report)	20. Security Classif. (of the	l nis page)	21. No. of pages	22. Price
Unclassified	Unclassified		57.	۸03

1		
•		